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CHICAGO, DECEMBER, 1913.

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THE TELEPHONE HEARING.

FOR some time past the United States government has been taking testimony in the effort to show that the American Telephone and Telegraph Company and its subsidiaries have violated the anti-trust laws of the nation. The immediate result of this proceeding has been to give the independent operators an opportunity to express their grievances—to relieve their minds of a load that has weighed heavily for many years.

That condition, no doubt, has something to do with the obvious regeneration of the independent spirit. From all over the country comes unmistakable evidence that the independents are "coming back"; which merely means that men who, discouraged by suspicions of the sincerity of their colleagues, had little disposition to continue the old aggressive competition, are now regaining their confidence and spirit. In their testimony against a common rival they stand revealed to one another; and they see that the neighbors they mentally charged with "selling out" are still Independent—with the big "I." At least some, and perhaps most, of the suspicions they have harbored for so long are proving to be baseless. The old friends are still true.

These facts having developed, the inspiration for regeneration becomes self-evident. The independent spirit depended always upon co-operation. That is why it has languished of late years, and that is why it is now showing signs of renewed vigor.

The hearing itself seems bound to be a long-drawn-out affair. No doubt opportunity will be given all who have any pertinent facts to place them on record. And there are a great many independent telephone men who are in possession of such facts and desire to add them to the accumulation. The taking of testimony has only fairly begun.

It would be unwise, even if it were possible, to forecast the result of this trial. Independent men, of course, are confident that the least they can expect is a decree against any further Bell-independent consolidations. The Bell people, no doubt, anticipate a complete vindication and approval of their "natural monopoly" principle; for men who live with an idea all the time are apt to be sincere in their belief in it. But while the hearing is in progress, at any rate, the independents have all the best of it. It is their inning; they are proving their true inde-

INDEPENDENT CONVENTION.

The Independent Telephone Association of America will hold its first annual convention at Hotel La Salle, Chicago, Tuesday, Wednesday and Thursday, January 20, 21 and 22, 1914, to discuss matters of great importance to independent telephony. All independents should attend.

pendence and have their old time rival in a corner—not the kind of a corner it would like to have on the telephone.

There is a saw, more modern than some, that "competition is the life of trade." It is so true that it has no exceptions—not even the telephone business. It is easy enough to prove mathematically that two companies cannot economically serve the same community. The indisputable fact remains that the highest intensity of application, the most concentrated effort, comes only under the spur of competition. Life itself is intensely competitive and living it has so trained us that it takes a fight of some kind to bring out our best efficiencies. Our adversary may be an actual, concrete business rival, or the intangible thing called "circumstances"; but if it makes our blood circulate faster, our eyes brighten, and our minds begin to hammer out ideas, then we are at our best. That is just as true of corporations as it is of human beings.

We all know that the independents have been suffering a sort of anemia of inactivity; but now the tonic effect of a new engagement and a new hope is manifesting itself. And more than one telephone man of undoubted authority and great weight of utterance has predicted positively that the recovery will be complete and independent telephony a greater factor than ever before.

THE TELEPHONE DIRECTORY.

ONLY the very smallest of telephone exchanges can get along without a directory of subscribers' names. Ten to twenty names and numbers is the limit of most men's ability to memorize without special effort. The bigger the telephone system the more important is its directory; until in cities like New York and Chicago, huge volumes are required, whose thickness is measured in inches and pages numbered in thousands. The latest directory of the Chicago Telephone Company, for example, is two inches thick, contains 1,280 pages, and is issued three times a year to take care of changes and additions. Not only does each subscriber, down to the four-party dollar-and-a-half, get a directory, but an additional copy is provided for each fifty-cent extension telephone on the premises.

We are accustomed to think of the telephone directory as purely and simply a directory for telephones. Some years ago that was indeed its sole function, for then the telephone was rather incidental and to have one or not to have one was wholly a matter of personal choice. Today only the poorer residences are telephoneless, and the business without a telephone is no business.

Thus, since everybody has a telephone, the telephone directory becomes a directory of everybody, and a directory that is in everybody's home. It is no longer necessary to make a note of your friend's new address, or to memorize it; you can look it up in the book just before you make your call. Your wonder as to what has become of certain old acquaintances need not be idle speculation; if they are still in town the book will undoubtedly show where they are located. A careful perusal of its pages may even reveal the names of friends and relatives whose presence in your city you did not even know.

On the commercial side, the classified section of the directory shows immediately the address of the nearest man who can paint your house, fill your teeth or sell you a pot of baked beans. It furnishes specialized mailing or calling lists for the prospective sale of various commodities. It relocates debtors who have skipped out and finds witnesses for the courts. In short, the telephone directory does a host of things every day with which the telephone itself has little or nothing to do.

That feature of the telephone book has come, unwittingly of course, but nevertheless positively, to be a part of the service performed by the operating telephone company. It is a service of no little value, although it is never reckoned as part of a basis for specific rates. Yet the publisher of a book of addresses the size of the Chicago telephone directory, guaranteed absolutely accurate and renewed three times a year, would have to charge a considerable subscription price to pay for the work of issuing it.

Hunting telephone numbers is only half the use that is made of the modern telephone directory.

"SAFETY FIRST."

IN the light of the present general movement for safety, one cannot avoid noticing that accidents to telephone linemen from contact with high tension wires are becoming a factor in the list of casualties. The extraordinary recent development of hydroelectric generation of power, with consequent long distance transmission at necessarily high voltages—sometimes above a hundred thousand—has occasioned considerable trouble to telephone circuits. The problem of induction alone from such lines is, of course, serious. This, however, is a matter more easily remedied by engineering than is the condition of danger to employes.

Line accidents that occur with the greatest frequency are classified by *Safety Engineering* as follows:

1. Those that are due to contact between telephone wires and badly insulated power cables (resulting in high-tension short-circuits over the telephone wires).

2. Those in which telephone linemen come into direct contact with live power wires, and receive shocks which are sometimes immediately fatal in themselves, and which at other times cause the men to fall to the ground so that they receive serious or fatal injuries indirectly.

When both telephone and power lines are carried upon the same poles, the telephones wires are often supported above the power cables; and the first point to be noted is that this common arrangement is distinctly dangerous. Work has to be done frequently on the telephone wires, as new lines are often added, and breaks due to wind, snow, ice, or sleet have to be repaired. Power lines, on the other hand, consist of heavier cables or wires, and they are often separately supported by heavy steel wires. There is little reason why such cables should break, or give trouble in other ways, after they have once been erected. As there is far more work to be done on the telephone wires than on the high-tension transmission cables or wires, it is manifestly better to have the telephone wires at least four feet below the power circuits, so that the men can work upon them without approaching the power circuits near enough to be exposed to danger. When the telephone wires are uppermost, careless linemen who are working upon them often stand on the power cables without taking any special precautions, although they are no doubt aware of the danger of so doing. The insulation of power cables is often unreliable, and is often quickly destroyed by the weather.

When telephone lines are run above power lines, extra care should always be taken by the workmen to avoid injury. In particular, a fiber sleeve, or other similar protection, should be applied to the power cables, to prevent the men from coming in contact with live high-

potential wires and the men should never work without rubber gloves.

In all new construction work the telephone wires, if they are not run on separate poles, should at least be carried on separate cross-arms, and be located below the power wires; and a distance of not less than four feet should intervene between the cross-arms carrying the different lines. On lines that are already installed, the telephone wires, if they are run above the power cables, should either be located so that if they break they will fall free of the cables or a guard netting should be provided to catch them. Guard netting should also be provided where different lines cross each other, and all guard nettings should be properly grounded, at short intervals, through ground wires that are in good connection with soil that is permanently damp. A very effective ground can be made by connecting the wires to underground metallic water pipes that are in constant use. The ground wires should be of ample size, and they should be carried down the sides of the poles through pipes or tubes, which should preferably be made of non-conducting material. If iron pipes are used for this purpose, they should themselves be well grounded, and the ground wires that run through them should be protected with a heavy insulating covering.

When power lines and telephone lines are run on the same poles, it is doubly important to faithfully observe the precautions that are required when running power lines alone.

In all cases, line wires that are temporarily out of service should be cut wherever they communicate with other wires; and if they are permanently out of service they should be entirely removed from the poles, at once.

THE TELEPHONE GIRL

Dr. Leonard P. Ayres, educational director of the Russell Sage Foundation, has this to say of the practical tests given the applicants in telephone work:

"The American Telephone & Telegraph Company employs some 23,000 operators. Applicants for positions are given a preliminary training of three months' duration in the company's schools, during which time they receive salaries. So many eventually prove unfitted for the work that more than a third leave within six months, involving a financial loss to the company running into very many thousands of dollars each year.

"The girls were examined with reference to memory, attention, general intelligence, space perception, rapidity of movement, accuracy of movement and association. The results showed that the girls who gave the best results in the tests were most efficient in practical service, while those who stood at the foot of the list failed later and left the company's employ. It seems fair to conclude that when such tests are perfected, short examinations of a few minutes each will prevent thousands of applicants from wasting months of study and training in preparing for a vocation in which they cannot succeed.

It is estimated by the Canadian authorities that every year some 600,000 telegraph and telephone poles have to be replaced because of their decay. Untreated red cedar poles last for 10 years, if the creosote is put on by the brush, they last 13 years; if they are tank-dipped they last 20 years. White cedar has a life respectively of 14, 17 and 22 years, according to the treatment, and yellow pine, 13, 15 and 20 years. It is estimated that creosote treatment would save upward of 260,000 poles per year.

A Lot of Loaded Lines

BETTER ADVERTISE.

[By Somebody.]

Breathes there a man with soul so dead
He never to himself hath said:
"My trade of late is getting bad;
I'll try another two-page ad."
If such there be, go mark him well,
For him no bank account shall swell,
No angels watch the golden stair
To welcome home the millionaire,
The man who never asks for trade
By local line or ad. displayed,
Cares more for rest than worldly gain
And patronage but gives him pain.
Tread lightly, friends; let no rude sound
Disturb his solitude profound;
Here let him live in calm repose
Unsought except by men he owes.
And when he dies, go plant him deep,
That naught may break his dreamless sleep—
Where no rude clamor may dispel.
The quiet that he loved so well,
And when the world may know its loss,
Place on his grave a wreath of moss,
And on the stone above, "Here lies ,
A man who wouldn't advertise."

Two-page ads in the trade papers ten years ago were the commonest occurrences in the independent telephone business. The advertiser who wanted to be really conspicuous took eight, sixteen or thirty-two pages at a crack. Maybe that is why the telephone business is not so lively today as it was then.

TRY THIS ON YOUR VOLTMETER.

[Definition of the word "Volt" in a Dictionary of 1766.]

Volt. In the manège, a round or circular tread; and hence by the phrase, to make volts, is understood a gait of two treads, made by a horse going sideways round a centre in such a manner that these two treads make parallel tracts, one larger, made by the forefeet, and another smaller, made by the hind feet, the croup approaching towards the centre, and the shoulders bearing outwards.

Sometimes the volt is of one tread; as when a horse makes volts in corvets and in caprioles, so that the haunches follow the shoulders, and move forwards on the same tread.

A renversed volt is a tract of two treads, made by the horse with his head to the centre and his croup out; so that he goes sideways upon a walk, trot or gallop, and traces out a small circumference with his shoulders, and a larger one with his croup.

This different situation of the shoulders and the croup with respect to the centre give this volt the name of renversed, as being opposite in situation to the former.

According to the London *Daily Mirror,* Dr. Arabella Kenealy has discovered that the human body acts as a battery, of which the head is the negative pole and the feet the positive pole. But where, asks the *Electrician,* is the spark-gap?

HE IS NOW STOCKED UP FOR TWENTY MINUTES OF BUSINESS.

[From a testimonial received by Old Ollie Dennis of the Premier Electric Company.]

Ship me by express 6 "Hi-Lo" horns at once.
I got 3 this morning and sold all of them in 10 minutes.

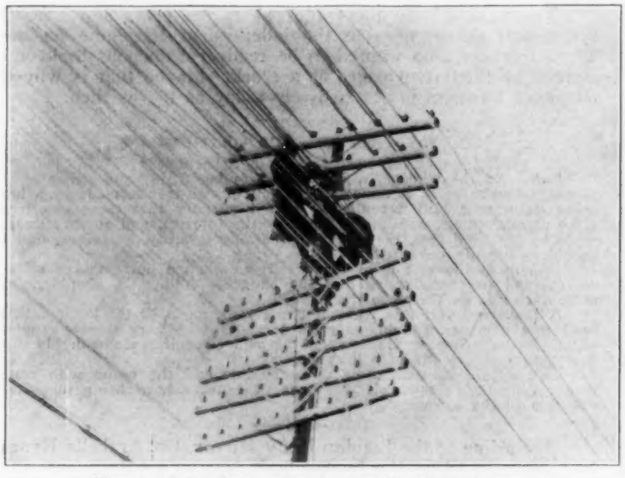
WHEN YOU SCARE THE BIRDS OFF THE WIRES YOU'RE LIABLE TO WRECK A TRAIN.

[Letter from "Traveler" to the London *Electrical Review.*]

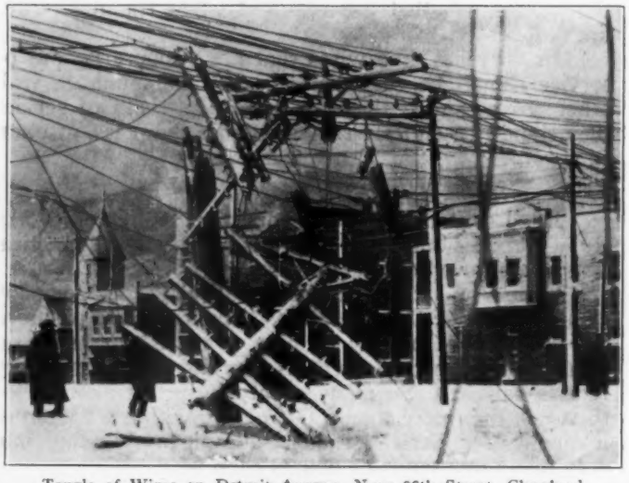
While waiting at a wayside station the other day, I observed some pigeons sitting on a wire leading from a signal cabin to a route of telegraph poles. When the birds flew away together, the upward bound which they gave at the commencement of their flight caused the wire on which they had been sitting to swing into contact with some of the telegraph lines. I was curious to know what effect in the signal cabin would be caused thereby. On inquiring I found that a stray current had entered the apparatus there, and that a false indication had been produced, giving the signalman authority to send a second train into a section which was already occupied. Pursuing my inquiries, I was astonished to learn that many railway instruments are liable to similar interference.

The British postmaster general, announcing the expenditure of half a million dollars in establishing automatic exchanges in his country, says: "While the telephonic service of the United States is more efficient than ours, it is not so efficient as ours will be eventually." It takes that kind of exaggerated optimism to get along at all with England's service. P. H. W.

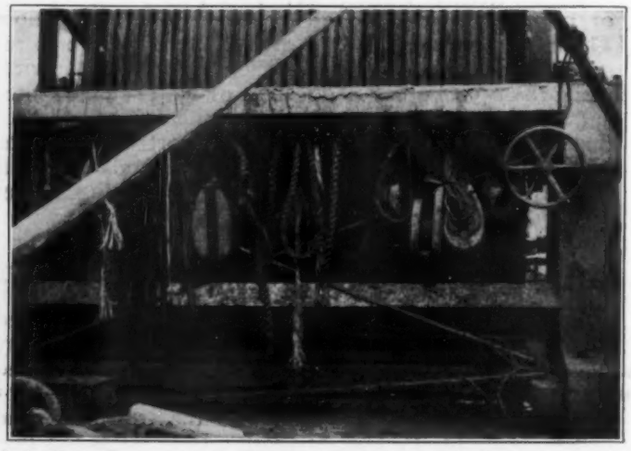
Storm Damage in Cleveland, Ohio, November 10. Scene on Detroit Avenue Near 72nd Street.



Heroes of the Storm, Cleveland, Ohio, November 10.



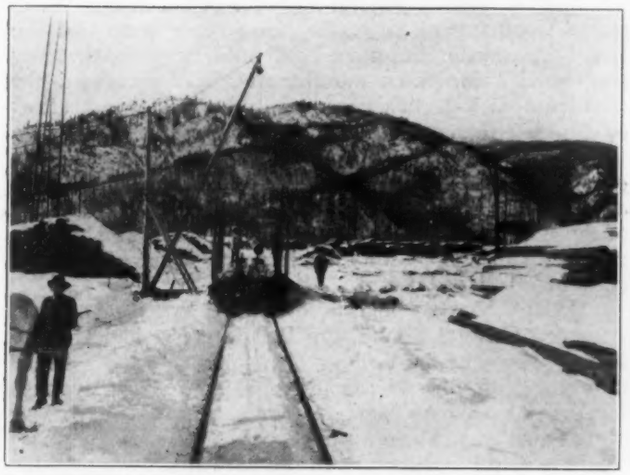
Tangle of Wires on Detroit Avenue, Near 66th Street, Cleveland, November 10.



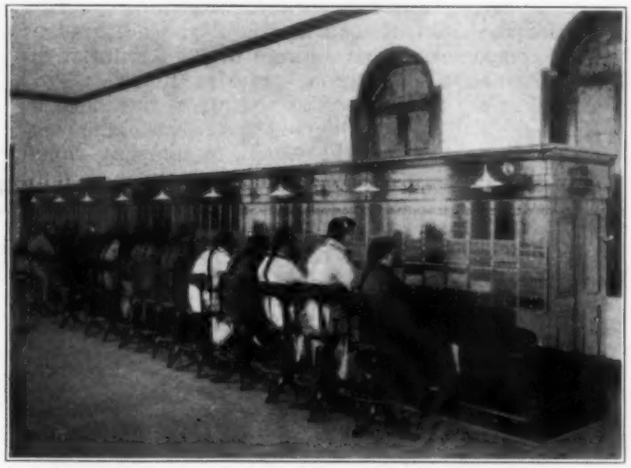
Two Scenes from the Motion Picture Film, "The Spinners of Speech," Made by Pathe Freres with the Co-operation of the American Telephone and Telegraph Company. Showing Incidents in the Laying of a Submarine Cable.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Unloading Telephone Poles from a Lake Freighter at the Toledo, Ohio, Yards of the National Pole Company.

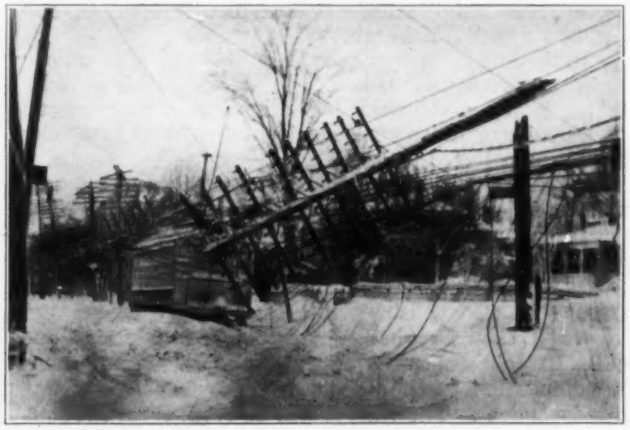


Getting Out the Telephone Poles. Courtesy of the Sandpoint Cedar and Lumber Company, Idaho.



The Operating Room in the Exchange at Pekin, China. Courtesy of the Western Electric Company.

Competitive Public Telephones at Viktoriapalatset, Stockholm, Sweden. Farther Booth Government, Nearer Booth Private Company.



Detroit Avenue Looking East from 65th Street, Cleveland, November 10.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Telephone Hearing in Chicago

The government's prosecution of the American Telephone and Telegraph Company on charges of violating the Sherman anti-trust act centered in Chicago for the last ten days in November. C. J. Smyth, special assistant attorney general in charge of the prosecution of the case, opened a hearing in the Federal building November 19 with the placing of W. S. Vivian, secretary of the Independent Telephone Association of America, on the witness stand. The hearing was held before Special Examiner Miss Mary E. Bell. While the government's suit is directed against the American Telephone and Telegraph Company as an entity, it is only in the control that the company has over the telephone service of four states —Washington, Oregon, Idaho and Montana—that the suit is particularly concerned. In these states the government contends the Pacific Telephone and Telegraph Company and the Mountain States Telephone and Telegraph Company have an absolute monopoly of the telephone business. The two concerns are subsidiary companies of the American Telephone and Telegraph Company.

B. G. Hubbell, president of the Federal Telephone and Telegraph Company of Buffalo, told of the efforts of Theodore Vail and H. P. Davidson to consolidate the Bell and independent interests of the country. He appeared for the government November 20.

About eighteen months ago, according to Mr. Hubbell, twenty-five or thirty independent telephone company heads met at the Blackstone Hotel. Mr. Vail, head of the Bell companies, in his address urged territorial division to eliminate competition, said Mr. Hubbell.

Pending the furtherance of the plans, the independents and the Bell company agreed upon a truce, the chief clause of which was that the American company would not attempt to absorb any of the independents until further notice.

Mr. Hubbell said that the break in the plan came in July, 1912, when the American company secretly acquired the Kansas City Long-Distance Telephone Company. According to a dispatch from Kansas City, the purchase never was completed, as the State Utilities Commission forbade the deal.

Testimony that where the American Telephone and Telegraph Company had a monopoly on the long distance telephone service they charged exorbitant rates was offered at the November 22 hearing by Edwin D. Schade, secretary and general manager of the Johnstown (Pa.) Telephone Company. Mr. Schade backed his assertion by submitting the schedule of rates on long distance service between McConnellsburg, Pa., and Pittsburgh, and Johnstown and Pittsburgh.

In the former instance the Central District Telephone Company has a monopoly of the McConnellsburg telephone service, and in the latter instance the American concern meets with competition from the Johnstown Telephone Company.

"McConnellsburg and Johnstown are each about seventy-five miles from Pittsburgh," said Mr. Schade. "The rate for a three-minute talk over the long-distance telephone from McConnellsburg to Pittsburgh is $1.45. For the same service from Johnstown the charge is only 40 cents. In McConnellsburg the American Telephone and Telegraph Company has a monopoly of the telephone field. In Johnstown the American concern meets with the competition of the Johnstown Telephone Company, an independent. The rate, it will be seen, from McConnellsburg to Pittsburgh is more than three times the rate from Johnstown for practically the identical service.

"This instance is typical of what happens to the public," the witness said, "when the Bell people get exclusive control of the telephone field."

Illustrating further from his experience in Johnstown, Mr. Schade submitted figures showing the relative gross and net earnings of the two companies per telephone in service.

The gross earning of the independent company per telephone, he said, was $25 a year and the gross earning of the American Company per year per telephone was $40. The net earning per telephone of the independent company, however, was $14.05 a year, while the net earning of the Bell people per telephone was only $9.25.

"The reason for the higher cost of operating the American Telephone and Telegraph Company's service is due to the huge unwieldiness of the company," said the witness.

On further examination by Special Assistant Attorney General C. J. Smyth, who has charge of the government's end of the case, Mr. Schade said when a call was made over a Bell telephone for a long distance connection with an independent company, the Bell people invariably connected the user of the telephone with the Bell Company operating in the territory communication with which was desired, instead of with the independent company operating in the same territory.

John Z. Miller, general manager of the Mutual Telephone Company of Erie, Pa., an independent, said the Bell Company in Erie gave 1,000 subscribers in that city free service for three months and later increased the free list to 1,500. This was done, he said, in an effort to eliminate the competition of the independent company.

Evidence was introduced November 24 in the form of an opinion of Justice Vickers of the Supreme Court of Illinois in a suit to have the alleged sale of a majority of the stock in the Kellogg Switchboard and Supply Company of Chicago to the Bell interests declared void on account of alleged fraud.

Justice Vickers held, according to Special Assistant Attorney General Smyth, the Bell interests had tried to secure control of the Kellogg Company solely as a means of cutting off one of the principal sources of supplies for the independent telephone companies.

It also was shown by the record in the Kellogg case that one of the stipulations of the agreement whereby the Bell Company had negotiated for the purchase was that the Kellogg Company would be continued as an independent for one year.

L. D. Kellogg, now president of the Kellogg Switchboard and Supply Company, a witness for the government, said the Western Electric Company was owned by the American Telephone and Telegraph Company, and would not sell its products except to that company. He said his company was not able to secure any business from the Bell interests and always had sold to the independent field only.

It was brought out an alleged attempt had been made early in 1911 by the banking house of J. P. Morgan & Co. to organize a $400,000,000 merger of the leading independent companies throughout the country with the Bell interests. Richard Valentine, manager of the Rock County Telephone Company of Janesville, Wis., described how this merger was broached by H. P. Davidson and Theodore N. Vail at a conference with representatives of certain independent telephone companies in the Blackstone Hotel, Chicago.

How to Get Good Service

By Frank L. Eldridge

CO-OPERATION.

AT VARIOUS times the question has been discussed concerning the probabilities of the establishing of permanent standards for independent telephone companies to work under, such as operating rules and regulations. While difficulty may be experienced to a certain degree in some localities, in securing the adoption of standards and methods which may be decided upon for the operation of independent telephone exchanges, this will not hold good as a general proposition, for the average manager of such telephone exchanges is as much interested in modern ideas and up-to-date methods for the proper handling of traffic as he is in the latest apparatus and equipment. For instance, if the very best apparatus is installed in a plant, without system and a competent operating force, the desired service cannot be rendered.

Frank L. Eldridge,
Manager Service Department,
Independent Telephone Association of America.

There are many companies who will say, when the question of operating conditions is discussed, that they are getting along in a satisfactory manner and do not care much what other companies are doing, or that they are not interested in making any changes in their present rules (providing they have any in use), or that they would be unable to induce their operators to abide by any particular instructions. Such replies have been made at different times when the proposition of efficient operating has been put up to them.

Regardless of what grade of service is being rendered by the company, there is always room for improvement, and as equipment is improved and changes are being brought about in the independent telephone field, the service must also be considered in order to keep abreast with the other improved conditions of the plant. It is not a question as to whether the operators would like to be governed by operating methods, but a matter which is entirely up to the manager, as to how he shall improve his service, and the average manager is interested in doing so if he can secure the necessary assistance, and knows that the majority of other independent companies are going to co-operate with each other and with the service bureau which has been established for their benefit and to whom they may refer for such assistance as is necessary at any time.

The operating of these companies can be placed on a basis second to none, from a point of rendering efficient service, and this will increase both traffic and revenue, and in many other ways promote the welfare of the company. It is time for all independent companies to get together and, with the aid of the service bureau, get their service on the best possible basis. By the companies adopting the same set of rules, not only a better understanding will be brought about between operators, but this, with the other methods and standards which it is hoped will be used, should bring all independent companies in closer touch with each other.

Suppose, for instance, all of these companies should issue instructions whereby the "A" or answering operator, the one the subscriber first meets on the line when picking up the receiver, would use the phrase "Number Please?" would this not tend to create a good impression on the patron or subscriber? This rule in answering is standard; however, there are companies which do not make it effective, and one particular office can be cited where the subscribers have been calling by name rather than by number. The operators have been answering by using such phrases as "Hello," "This is Central," or in some other manner. This particular office has recently standardized in connection with the answering of "A" operators, they now answering by using the phrase "Number please?" with splendid results to both the company and the subscribers.

This word "please" is a big word and carries a lot of weight with the subscriber or patron, especially if it is spoken by a trained voice in such a manner that the spirit of friendliness and good will is conveyed to the calling party. A subscriber often forms a good or bad opinion of the company by the manner in which his call is answered and handled. This is second in importance only to the equipment itself, and pleased subscribers are surely mighty good publicity. It should always be our aim to convey to the subscriber by means of pleasant courteous service, our appreciation of his business.

There may be some changes required in the various offices where certain standards and practices are now effective; however, every independent company is urged to make the operating rules of the Service Department of the Independent Telephone Association of America, effective in all of its exchanges, just as soon as they are ready for distribution. If this is done, we will all be handling our traffic and operating under the same methods.

The purpose in discussing the "A" or answering operator at this time, and the method of answering, is due to her being the first person with whom the subscriber comes in contact, and that the "A" position is the first and the one of most importance in a local exchange when considering standardizations. Therefore, it will be an advance step in the direction of improved operating if all exchange managers will make the answering phrase effective, as called for by the new local operating rules of the Service Department. Perhaps considerable time has been given to discussing this one rule, but a great achievement will be accomplished if all operators are answering in the same manner.

In order that progress may be made in any organization or industry it is necessary that changes be made that will make it possible to meet competition and keep up with the times. Should your switchboard fail to serve your purpose because of increased business, or become obsolete so you were unable to render efficient service, it would become necessary to get additional or new facilities in order that new business offered might be handled in a satisfactory and efficient manner. The same principle applies to the operation or handling of your traffic.

Modern methods must be effective to meet the requirements of modern apparatus.

Standardization of operating rules will improve your service in many ways. Your operators will not hold subscribers on the line as long as they do when not following standard practices. They will not be asked all sorts of questions and be required to carry on conversations with subscribers, or allow the subscribers to keep them busy answering unnecessary questions, thus allowing other calls to pile up, and the position to become "swamped."

Your subscribers will certainly appreciate the value of a regular system for operating, through the improved service which will be rendered, and while the new method of handling their traffic may be somewhat of a novelty at the start, they will soon appreciate the value of answering them and looking after their service in a prompt and business-like manner. This brings out the idea of why rules are so necessary, and also proves, or should at least make plain, some of the objects of the Service Department. But what we are attempting to accomplish can only be brought about through all of our operating companies adopting the same rules, methods, and regulations, and making them effective.

It is the intention of this department to publish many of the inquiries of its members regarding important subjects on which they seek advice. The answers will also be given as rendered by competent telephone men who are interested in the Service Department of the new organization. Some of these inquiries and the answers appear at the close of this article.

Where an application is received from an independent telephone man seeking employment, this will also be published giving sufficient information concerning his qualifications, etc., and the original correspondence can be seen by applying to the Service Department. This also applies to operating companies who are looking for help, and the association will make their requirements in this respect known, in order that they may secure competent people for their exchanges. So any member of the association wishing advice of any nature, or additional employes, should write the Service Department.

LONG DISTANCE SERVICE INSPECTION—METHODS OF INVESTIGATING POOR TRANSMISSION AND RESULTS OF OVER-SUPERVISION.

A written complaint from a telephone subscriber is usually well founded. This is true especially, when originating with large responsible firms. Suppose a complaint of poor transmission is received; what should be the first step in investigating the alleged poor service?

There are no doubt companies who send an inspector to make service tests between the two subscribers terminals which are involved; and probably, the first thing the inspector would do would be to call the long distance operator and place a call in the usual manner. This would only be natural; but there are other methods for making such inspections, which may be of value to either large or small company whichever is rendering service at the originating station, where a complaint is received.

These service tests are very expensive where the use of considerable toll line is necessary, and especially so where long haul circuits are used, in addition to several operators being required in the handling of the connection; not taking into consideration the good circuit time which is consumed without bringing revenue to any of the companies whose lines are used. Regardless of the class of circuits necessary in making these tests, revenue is lost in making such inspection over toll circuits.

In order not to unnecessarily tie up long distance circuits, the primary step in making transmission tests is to have a thorough inspection and test made of the subscriber's instrument and line. For instance, some offices are equipped with 30 miles of No. 18 gauge artificial cable for testing purposes, cut in at the wire chief's desk, or an instrument composed of several miles of artificial cable is rigged up as a portable test set. Very often, when talking through this artificial cable, the subscriber's loop will be found in very poor condition, and this, in many instances, accounts for the poor service rendered, without proceeding further with the test.

However, if a cable test is not possible, and the office involved is a local battery plant, it may be found by replacing the dry cells in the subscriber's instrument that this will account for the poor service. Run-down local batteries greatly impair transmission over toll lines, and the longer the toll line, the more important is good transmission battery supply. Dry cells inspection at regular intervals should be of great assistance to the small company in overcoming such complaints.

A method or system for locating such poor service in as simple and economical a manner as possible is of importance and what all companies are interested in.

All offices which are handling their long distance traffic in accordance with standard operating rules should be in a position to make tests under the same condition; use the same lines and trunks; establish the connection at the same position, and in the same manner as when a connection was established on which poor service has been experienced.

Operating rules provide that trunk and position numbers, also the number of the pair of cords at the line board used, shall appear on all tickets, covering both in and out traffic. This will not only help to provide means for locating such trouble when tests are made, but will assist a company in many other ways, when seeking information concerning poor service. Therefore, when making transmission tests, it can readily be seen that the same lines, trunks, etc., can be used as when trouble was originally experienced, and this done by referring to the ticket covering the call upon which the subscriber claims poor service. However, where a complaint is received by the small office, it is well to test all of the toll position cords, providing information cannot be secured from the tickets which will show the actual equipment involved when the connection was established on which the subscriber claims poor service.

In many cases, in the larger offices, it is found that poor transmission is caused by defective cords, or by faulty equipment at the subscriber's station.

When the cause of poor service is discovered by the line operator, a poor service report should immediately be made, giving all possible details of trouble experienced, and referred to the proper authority. If it is found that the poor service is not caused by faulty equipment at the originating station, the report should be forwarded to the manager at the terminating point, in order that a thorough and speedy investigation can be made.

No doubt instances can be recalled where discussions have taken place at district, state, or other meetings, between various local managers, each stating that poor service is being experienced on certain long distance circuits, and in nearly every instance, claim is made that the trouble is on the other company's end of the line. There is no question that if poor service reports were made out, and a prompt investigation made in each instance, these matters would not have to be brought up in this manner, but could be investigated promptly if the companies involved would co-operate with each other and make the

necessary investigation. Whenever possible, the line should be gone over carefully, and the trouble located and eliminated permanently.

There are other reasons for poor transmission which is not caused by either lines or equipment, but due to over-supervision on the part of operators, and this form of poor operating is just as serious as if there was no supervision at all. This brings up an instance of some years ago, where a large corporation in a central western city complained of poor transmission on connections to its home office, several hundred miles distant. The conditions were these:

The call was placed by the manager with his private branch exchange operator, who in turn called the "A" operator, and was then trunked to the toll recorder. She, in turn, passed the ticket to the line operator. However, when the distant party was ready to talk, all that was involved was the subscriber's terminal passing through his branch exchange, the local exchange trunks, and the long distance line position.

In the establishing of this particular connection, one switching office was involved; at the terminating office, the long distance position, local trunks, local branch exchange, and subscriber's terminal. When the complaint was originally received, the subscriber's instrument and line tested O K, it being found that both were standard, and could be used in talking several hundred miles. In fact, these were the results of the tests at both the terminating and originating offices.

After this part of the investigation had been completed, and tests were made over the toll circuits, the transmission continued poor, and the cause could not be located. After considerable study it was suggested that there might possibly be too much supervision. With perhaps the branch exchange operators in on the connection at both ends, and possibly the switching operator listening in at the intermediate point, as well as the line operators at both the originating and terminating points, it would be only with great difficulty that the subscribers would recognize each other.

Additional tests were made after instructions had been issued by the telephone companies that all operators involved were not to listen in on the connection further than to ascertain whether conversation was being carried on in a satisfactory manner. The subscribers at both points instructed their branch exchange operators not to listen in unless requested to do so, and with these conditions prevailing, an improvement of 75 per cent in transmission was found, and both subscribers were entirely satisfied.

After an explanation had been made to the subscriber concerning the cause of poor service, he exclaimed: "Trying to talk with several operators in on a connection is about as possible as pouring water through a pipe which is full of holes," and this comparison was about correct, as considerable repetition will always be necessary when talking over a line where there is too much supervision. It should be easily understood why service reports covering poor transmission should be followed up; also why all companies should co-operate with each other in eliminating poor service which has been brought to their attention. If this is done, and the necessary tests are made to locate the trouble complained of, a great deal of trouble now experienced would be cleared without ever being discussed to any extent, and complaints would be reduced to a minimum.

The Service Department is arranging for the distribution of bulletins on many subjects of importance that will assist companies which are having difficulties. These bulletins will furnish valuable information for the proper maintenance of circuit and pole lines, as well as many other suggestions which will be beneficial. To assist in this work, companies experiencing any difficulty should write the Service Department, which will be pleased to hear from them with the view of furnishing information that will be of assistance; and all independent companies which have any special methods for clearing trouble, or information that will be of benefit to other companies, should forward this advice to the Service Department, in order that it may be distributed or conveyed to other companies, for the general good that can be done.

SOME PROBLEMS SOLVED.

The Service Department of the Independent Telephone Association of America is in receipt of an inquiry from one of its member companies, concerning several important problems with which it is confronted. The information asked for by this particular company, and the advice and decisions are rendered by a legal friend of the Service Department, are given below.

There are, without doubt, a great many other companies which are experiencing the same troubles as this company. The questions have been asked verbally by other operators in various states, who have stated that it is with difficulty that suitable contracts are secured in dealing with rural companies; that the question of high tension lines which are built to parallel their toll circuits causes no end of poor service, and their subscribers at times have abandoned the use of the long distance lines.

Therefore, the information as furnished should be of interest to all companies, and the opporunity to secure various forms of contracts covering service rendered rural companies should be taken advantage of by any company furnishing such service.

Here is the question, or questions, submitted:

The ..... Light & Power Company, at ....., has built in parallel to us, and its power, being 33,000 has about ruined our toll business, and we have metallic lines too. Please advise whether or not we have any redress against these people for this.

A new power company has started in business in ....., and is setting its poles through our lead. Our franchise is not exclusive, but we feel we will have the protection of the court if they damage us in any manner, whether from induction or contract; are we right in these questions?

We are switching farm lines and own the lines to the town corporation limits; we have some people on those lines who refuse to pay us, claiming that they are only calling their neighbors; we have no contracts with the line nor the individuals; what can we do? Can we cut the line off at the city limits, or can we force the people who own the line to make these people come across?

Wish you would get up the very best contract that can be gotten up for rural switching services and have several types, the farmers to furnish all the instruments and do all the work outside of the town limits. We are getting $5.00 per year and giving one town.

The minimum charge which one company makes for service of this kind, is $3.00 per year, as will be noted in the contract left open. Any stations over and above the ten on that contract may be installed at a sliding scale down as low as 15 cents per month.

Some of our connecting companies have rural exchange contracts where they have a switching rate only, at five cents per message. This would cover every call that the operators have to handle. Some rural lines are equipped with a generator shunt, so that in ringing the local patrons on a line they do not throw the drop at the central office.

Following is the answer to this question as supplied by the Service Department of the association:

With reference to the questions asked by the ..... Telephone Company, you are advised that as to interference with power companies, the general rule is that, prior authority to one of the companies to occupy, or prior occupancy of, the streets will not confer upon such company an exclusive right. The right of the prior license, however, must not be subsequently invaded by the later company. Such subsequent builder is under the duty to so construct and maintain its lines as not to interfere with the right of the prior occupant of the streets to properly

maintain and operate its lines, and to transact the business it is authorized by its franchise to transact. (*Joyce on Electric Law, Section* 517; Nebraska Telephone Co. vs. York Gas & Electric Light Company, 27 Neb., 284; 3 *American Electrical Cases,* 364 Rocky Mountain Bell Telephone Co. vs. Salt Lake City Ry. Co.; 3 *American Electrical Cases,* 356; *McMillan on Telephone Laws, Section* 139.)

The matter has also been discussed as between two telephone companies in Northwestern Telephone Exchange Company vs. Twin City Telephone Company, 89 *Minn.* 495. If the ..... Telephone Company is upon the highway and the ..... Light & Power Company has so built its lines as to render the telephone company's lines useless, the telephone company can force the power company to either remove its lines or to pay the costs of so changing the telephone company's lines or the power line as to remove the damages done. The court would probably require that change to be made which could be done at the least expense; that is, if by moving the telephone lines, the damage could be done away with at less expense than by changing the light lines, the court would order the telephone lines to be changed, and assess the costs of such change against the light company. The law in the various states is not uniform, but in every case, the prior occupant of the street has been protected against injuries from a subsequent plant. The ..... Telephone Company should be advised to place the entire matter in the hands of an able attorney, and he undoubtedly can clear the matter up for them in short order.

The above also applies to the case of the power company which has started business in ..... They must so build their lines as not to interfere with the telephone company, or they will be liable in damages.

Relative to switching for farmer lines, you are advised that where no contract exists between the telephone company and the rural company, the telephone company can, upon thirty days' notice, cut the rural line off at the city limits if the latter refuses to sign a reasonable contract for connection. I am of the opinion that it is entirely reasonable for a telephone company to demand and collect connection fees for all telephones on a rural line, for the reason that every ring upon a line, whether the farmers are talking among themselves or not, throws the drop upon the central board, taking the time of the operator in restoring the drop, or ascertaining if the calling party wishes central or not, and also for the further reason that it is absolutely impossible for any party to be connected with this kind of a line and keeps them from using the central exchange facilities.

I understand that a new utility law has just been passed in ....., and if this is true, and it takes effect within a short time, I would advise this company that it wait until the law takes effect and then, upon thirty days' notice, cut off the line and require the farmers, in the event that they then refuse to sign a reasonable contract, to apply to the commission for relief. The company could then answer the complaint before the commission, setting up that it is willing to give connections upon a reasonable contract, and I am certain that the commission would uphold it in their contention, and bring the rural line to time.

In reply to the inquiry as to forms of rural line telephone contracts, I submit herewith two forms in use by one Company under which they have never had any serious difficulty.

Paragraph 4 of the contract provides for exclusive connections, and in some states under a physical connection law, they would be inoperative, but I would leave that in the contract anyway, as in ninety cases out of a hundred, rural lines would not question it, and the telephone company would have the benefit of exclusive connections, and in the instance where the rural telephone company did question that feature, the commission would simply hold that particular paragraph to be inoperative, and uphold the balance of the contract.

Any operating companies desiring form contracts covering service rendered rural companies, may secure them by writing to the Service Department. The department has copies of contracts used by several of the prominent companies, and would be pleased to hear from any independent company interested in this matter.

The following are other questions and their answers handled by the Service Department of the association:

1. Is it possible for a line to get induction through a lead sheath paper cable when it is disconnected at the cable terminal? If so, state how and why it can be, and if grounded sheath makes any difference.

Answer: The induction could be caused by split pair, leaky cable or unbalanced line. This can be readily detected by putting a buzzer on the leaky pair. This noise would be heard on all other conductors in the cable. Grounding the sheath would not be certain to clear this trouble.

2. There is one feature of our business that we have not as yet found a very practical solution of, and inquiries among the trade supplying test boards has not developed anything within the limits of cost which we can stand. We have over thirty metallic circuit rural lines terminating on our main board, have no test panel, but bring them in from the outside work on insulated twisted pairs of best quality copper clad drop wire onto No. 400 arresters directly connected to the board. While we are subject to very heavy lightning in this country, we find the arrangement has stood up the best of any that has been tried. We use a Queen's Wheatstone bridge and the ordinary telephone test sets, but have no way of quickly testing out the trouble on lines as could be done from a panel with cords, etc., and no way of making up and taking down phantom circuits which we have thought of using by use of cords and plugs on a test panel.

Any practical suggestions would be gratefully received.

Answer: It cannot be determined whether a wire chief's desk is desired to be used for testing the lines, or a regular composite panel to be used for the purpose of phantom facilities on the existing farmer's line. No doubt what is needed is a testing desk as it is stated that testing is now being done with a Wheatstone bridge. The desired results could be secured by a standard wall testing desk equipped with double scale volt-meter.

Regarding test panels, it is not customary to connect rural lines through a panel of this character, as it would not be necessary to phantom any great number of these lines. The more economical arrangement would be, after determining the number of phantom circuits to be used, to place the coils on a shelf, running a cable to a terminal strip alongside of the present protectors, which are in use suitably arranged to cross-connect to same. These cross-connecting wires would then be run to the switchboard side of the arrestors, so as not to interfere with the testing of the outside lines. This arrangement would not cost much, and the only investment would be the cost of the coils.

The following application has been received by the Service Department from a competent telephone man: Any company in need of a well qualified manager will be furnished the name and address of the applicant.

It occurred to me that as you are in touch with various independent telephone companies, perhaps you might know of an opening for a manager. I have been general manager of the Home Company properties for seven years, engineered and constructed the new ..... exchange. I came here from ..... City, where I held a position as general foreman for the ..... Company. Prior to that was general manager of the Home Telephone Company's properties in ..... I am qualified to hold any position and can refer you to good people with whom I have been associated.

If you can refer me to parties who are looking for a manager, I can assure you that results will be produced that will satisfy any board of directors.

"A. P" Uses Telephone in Northwest

The Associated Press has begun to distribute news from its Spokane office by telephone. This is an innovation in the distribution of news in the Pacific northwest, although the telephone has been used with marked success for more than two years in the middle west.

The telephone is used to supply papers that do not need the full leased wire service and displaces what is known as the abbreviated telegraph or "pony" report. The telegraph pony has been sent with many words omitted, the paper which received the report having to supply the missing words.

In the telephone service, with a rapid typist receiving, all words will be read and the paper will do little or no editing of the report.

The Pacific Telephone and Telegraph Company has installed special equipment in the Associated Press office at Spokane.

The installation of the new telephone circuit adds new territory to that served by the Spokane office, which now edits and supplies news to Idaho and Montana points. It is probable that other daily papers in eastern Washington and northeastern Oregon will be added to the new circuit.

Traffic Distribution in Manual Work

By J. Baumann

IN the organization of the service of a manual telephone exchange the most difficult problem is the even distribution of the load over the whole staff of operators on duty. The means hitherto employed for the purpose—viz., frequent use of the intermediate distributing frame, ancillary jacks, etc.—have proved quite inadequate, with the consequence that manual exchanges are working with an excess of operators, wasting time, labor and money. The annual value of this waste for the whole telephone service of Europe amounts to several millions.

Consider the case of 10,000 subscribers, on a manual exchange, handled by some dozens of operators. Each subscriber's line ends at a certain operator's position in a signal, by which the subscriber may call the attention of that particular operator, assuming no team work. At the same operator's position from 70 to 100 other subscribers' lines also terminate in signals, and when one subscriber operates his signal his operator may be idle or she may be occupied answering another subscriber. In the former case, the calling subscriber is attended to immediately; while in the latter case he has to wait until his operator has finished with the previous call. During this time an operator at another section of the board may be idle, but she cannot help the waiting subscriber, because she cannot see his signal. In actual practice the operators at adjacent positions have access to a subscriber as well as the operator on whose position his signal appears, so that any idle operator out of three may help one of the team. This possibility, however, fails to meet the vicissitudes of the traffic in exchanges of any considerable size, and an enormous waste is therefore caused by the inequality of load on the different operators' positions. The first attempts to reduce this waste consisted in a frequent use of the intermediate frame, by which the line of a busy subscriber might be transferred from the position of an overloaded operator to one of light load. But nowadays the traffic of many subscribers may change so rapidly and to such an extent that it is very difficult to follow the fluctuations by this method. Even a daily rearrangement of the lines on the intermediate frame, as is usual in many exchanges, is insufficient for a fair distribution of the load.

A second step in the same direction was the invention of ancillary jacks. In the ancillary jack system each subscriber's line, instead of terminating in one answering jack and one calling lamp, is connected to three jacks with three lamps at different operators' positions, so that every call is shown simultaneously at three positions in the exchange. As any of the three jacks may be reached by three operators, the number of operators available for answering a call is increased from three to nine. It is clear that this multiplication of jacks and calling lamps promotes uniformity of traffic pressure to a certain extent, and reaches its maximum value in an exchange of nine positions, where the whole staff thus becomes one team. As the number of positions increases the advantages of the system decrease, and in the case of "Avenue" exchange in London there is only one calling lamp for every 41 operators. There are also serious drawbacks connected with the system.

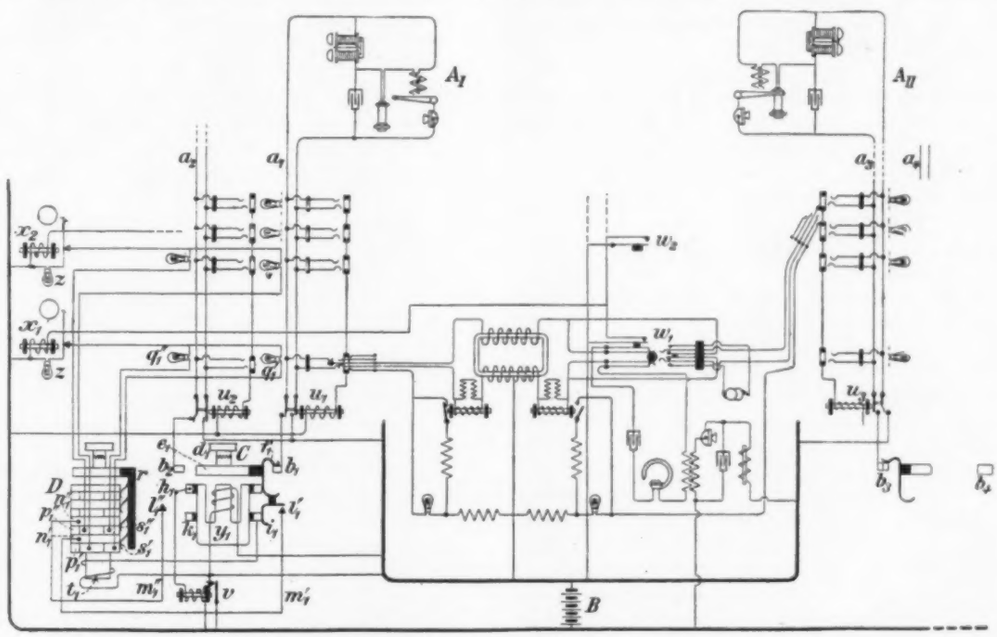


Diagram of Baumann Distribution System Applied to Common Battery Working.

First, in any call the glowing of two of the lamps is superfluous. It would be sufficient if the lamp at the free operator's position only were to glow. Second, if it should happen that the three operators are idle, they may all insert their answering plugs at the same moment, and the work done by two is not only wasted but actually gives rise to confusion. Third, the current consumption of the calling lamps is tripled, and this is only justified if the time during which the lamp is glowing is reduced to

one-third of that in the ordinary system. Fourth, for every subscriber, the exchange equipment is increased by two lamps and two jacks with their accessories. This means considerable additional standing charges, inasmuch as any apparatus individually allotted to a subscriber is only used a very small fraction of the available time—say 2,400 seconds out of the 86,400 seconds per day—and is idle during the remainder. Fifth, owing to the fact that each subscriber's signals affect three operators' positions simultaneously, and, further, that the traffic pressure on these three positions is continually varying, the effect of transferring a subscriber's line at the intermediate frame cannot be foreseen and becomes quite incalculable. A transfer may be beneficial to one position and harmful to the other two, and in most cases it would be preferable to leave the intermediate frame undisturbed.

The provision of a greater number of operators for dealing with any one subscriber is the solution of the problem. Preferably the whole staff on duty should be accessible to each subscriber. There are three ways in which this may be achieved: (1) The number of ancillary jacks, with individual signals, may be increased. (2) Every subscriber may be provided with separate apparatus, which will enable him to select a free operator for completing his connection. (3) Apparatus common to the operators may be provided in the exchange for taking up the incoming calls and forwarding them to idle operators.

Multiplication of the ancillary jacks is impracticable on account of the drawbacks mentioned above. The second method is derived from automatic telephone practice. The apparatus corresponds to the pre-selector, which connects the subscriber with an idle set of group selectors. On lifting his receiver, the subscriber operates his individual calling relay at the exchange, completing the local circuit of a driving magnet, which actuates a wiper by steps over a bank of contacts, each of which is connected to an operator. The moment the wiper passes over a contact connected to a free operator it is automatically stopped and the operator signaled, and the insertion of the answering plug connects the operator's cord circuit to the subscriber's line through the wiper contacts. This method is, however, liable to serious objections: (1) The traffic-distributing device allotted to each subscriber constitutes a considerable increase in the subscriber's equipment at the exchange. To give access to all operators on duty in the busy hour, it must contain from 60 to 70 or more operators' contacts, in a 10,000-line exchange, and would therefore be a very costly and cumbersome piece of apparatus. (2) As the traffic distributor must be provided for each subscriber's line, the total cost of this additional apparatus may amount to one-half of the cost of the complete exchange equipment. As regards the time this apparatus is in actual use, the same objections hold good as have been raised against the multiplication of the answering jacks and calling lamps, and the standing charges are even greater than in the ancillary jack system. (3) In an exchange with 60 operators on duty in the busy hour, the number of steps in the movement of the wiper may amount to a maximum of 60 for a single call, corresponding to 1,440 movements of the mechanism per day in an exchange like London's "Avenue." The average will be half this number, and means, of course, a heavy strain on the working parts of the apparatus, with considerable liability to breakdown and rapid depreciation. The maintenance costs for so much sensitive apparatus are higher, and the total working expenses of the exchange are considerably increased. (4) In most exchanges subscribers are not all entitled to the same service facilities. If there be two kinds of service, and one calling lamp is indiscriminately used for any subscriber, the traffic must be divided in such a manner that each section of subscribers has its own staff of operators. The equality of distribution is thereby reduced to less than half of that attained by combining all the subscribers with the whole staff of operators.

The third method of distribution may be applied in the following manner: The subscribers are divided into groups of 50, 100 or more. The subscribers' lines of one group are each connected to separate contacts arranged on the circumference of a circle, in the center of which there is a continuously rotating spindle, and on this spindle is mounted a wiper, which traverses the contacts on the circumference. When a subscriber lifts his receiver, current from a central battery is sent over the subscriber's line and through an electromagnet at the exchange at the moment the wiper touches the contact connected with the calling subscriber's line. The electromagnet is energized and stops the wiper at that point. This closes a circuit connecting the contact to a second continuously rotating switch. On making contact with a free operator's connection the wiper of this second switch is stopped in the same way, and a calling lamp glows under the subscriber's jack on the selected operator's position. The operator inserts her answering plug, the two-switch electromagnets are de-energized, and the switches immediately proceed to hunt for a second calling subscriber in the group.

An application of these principles to the Western Electric common battery system is shown in the diagram. A_1, A_{11} are two subscribers' stations, and a_1, a_2, a_3, a_4 are four subscribers' lines connected respectively to their calling contacts b_1, b_2, b_3, b_4. On lifting the receiver at A_1 current flows from battery B, through a calling relay v, common to the subscribers of the group, by way of the line and station A_1. The armature of relay v completes the circuit of electromagnet y_1, of switch C. The rotating spindle of this switch carries at its lower end an iron disc, e_1, to which the insulated wiper f_1 is attached. This wiper passes over contacts b arranged in a circle and insulated from one another. There are as many contacts in each switch as there are subscribers in one group. Beneath the iron disc e_1 is a jacketed electromagnet carrying an insulated brass ring, h_1, in continuous contact with the wiper f_1, and an insulated contact spring, i_1, sliding upon another ring, k_1, connected to the common battery, is attached to the lower end of the wiper. The contacts l'_1, l''_1, l'''_1, etc., are connected by leads m'_1, m''_1, m'''_1, etc., to the second rotating switch D, each of the contacts l'_1, etc., corresponding to one of the subscribers' contacts b'_1, etc. The conductors m'_1, m''_1, m'''_1, etc., lead to fixed metallic rings n'_1, n''_1, n'''_1, etc., mounted on the cylindrical core of the switch D, and these rings alternate with, and are insulated from, an equal number of rings p'_1, p''_1, p'''_1, etc., subdivided into insulated segments. The number of segments is equal to the number of multiple sections in the exchange; each segment is connected to a signaling lamp q'_1, q''_1, q'''_1, etc., at one multiple section. In switch D, a vertical arm, r, of insulating material, carrying metallic wipers s'_1, s''_1, s'''_1, etc., is kept in continuous rotation, so as to connect rings n'_1, n''_1, n'''_1, etc., successively to the adjacent segments of rings p'_1, p''_1, p'''_1, etc. An electromagnet, t_1, is connected between the battery and ring k_1; its armature is a rotating iron disc carrying the arm, r, and otherwise similar to the armature of switch C.

The operation of the circuits is as follows: On lift-

ing the receiver at A_1, the calling relay v is actuated as soon as the wiper f_1 touches the contact b_1 connected to the calling subscriber's line, thus energizing electromagnet y_1. The rotating iron disc e_1 is disengaged from the rotating spindle d_1, and holds the upper end of the wiper f_1 tightly against the contact b_1. At the same time spring i_1 is lowered into contact with l_1, completing a circuit from battery B through the winding of electromagnet t_1, ring k_1, conductor m'_1, ring n'_1, wiper s'_1, the adjacent segment of ring p'_1 in contact with s'_1, and the calling lamp q'_1 on the first operator's position. The operator inserts her answering plug and the cut-off relay u_1 of the calling subscriber disconnects the common relay v from the subscriber's line. The armature of this relay is released and breaks the circuit of electromagnet y_1; the iron disc is lifted by a spring, breaking the contacts f_1—b_1 and i_1—l_1, and re-engaging with the rotating spindle. The electromagnet t_1 being thus de-energized its armature is also lifted and re-engages with the spindle of switch D. The wiper s'_1 thus leaves the segment connected to lamp q'_1 and passes on successively to segments connected to lamps q_2, q_3, etc., on other operators' positions. In the meantime lamp q'_1 has been extinguished by the breaking of contacts i_1—l'_1.

Having inserted her answering plug, the operator throws her listening key, and by so doing, not only connects her talking set to the subscriber's line, but also closes the contact w_1 and energizes a relay x_1, the armature of which breaks an earth connection common to all calling lamps on the operator's position. As a contact, w, is provided in every listening key, it is impossible for a second call to arrive at that position as long as the operator is using any of her keys for listening, but having answered a call and thrown the key to the ringing position, the operator may receive another call from any subscriber. Testing and completing the connection is done in the usual manner.

If it should happen that, during the brief interval between the appearance of the signal and the insertion of the answering plug, a call comes from another pair of rotating switches, C_2D_2, to the same operator's position, this second call would be immediately cancelled by operating the listening key; the armature of switch D_2 would be released and would continue hunting for another free operator. Such a call may also be attended to by an adjacent operator before it has passed forward to another position. The relay x may evidently be used to record the time an operator is holding her listening key in the working position. In this way an invisible, impersonal, and therefore absolutely impartial supervision may be kept on the work done at every moment by each operator. The usual pilot lamp may be included in the common earth connection for the calling lamps of an operator's position, and for measured-rate subscribers, meters may be provided in the ordinary way. No separation from the flat-rate subscribers is necessary, the whole traffic being distributed over the entire staff on duty. It is also evident that the number of operators kept on duty may follow the requirements of the load by steps of one operator, members of the staff being dismissed one by one, beginning at the end of the switchboard. For this purpose it is only necessary to throw a listening key on all vacated positions.

If every subscriber is provided with a calling lamp in every section of the multiple, during night-time the whole exchange could be operated from one section, or three operators' positions. The inconvenience, in night operating, of having to watch the whole switchboard of the exchange is thus avoided. In an ordinary exchange there is, however, no necessity for all subscribers to have a lamp in every section. In the case of exchanges with 4,000 to 10,000 subscribers, 50 per cent of the whole traffic is originated by 25 per cent of the subscribers. The traffic of these subscribers (flat rate) is also the determining factor of the busy-hour load. The remaining subscribers are partially flat rate and partially measured rate, and the division of the other 50 per cent of the traffic is governed by the proportion between them. Under ordinary circumstances it may be assumed sufficient if 25 per cent of the subscribers' lines are represented by a lamp on every section of the multiple; 30 per cent by a lamp on every second section; and 45 per cent by a lamp on every third section. By such an arrangement the whole service can be concentrated during periods of minimum load to three multiple sections, or nine operators' positions. If the switches, D, are all of the same pattern, having the same number of segments for each class of subscriber, it is convenient to cross-connect two diametrically opposite segments in the case of a subscriber having only one lamp on every second multiple section. The effect of this is that the subscriber, having stopped switch C, is signaled twice per revolution of switch D to the operator corresponding to the connected pair of segments. Similarly the segments can be cross-connected at 120 degrees for subscribers having lamps only at every third multiple section. This, to a certain extent, compensates for the reduction in the number of operators accessible to the subscriber.

The operation of switch C may be briefly considered here. The 100-line model is provided with one wiper making a complete revolution in two seconds. On the average the wiper makes connection with a subscriber's line one second after the receiver has been lifted. This delay is reduced to ½, 1/3 or ¼ second if two, three or four wipers are provided, arranged so that no two wipers make contact at the same time. Switch D makes one revolution in ¼ second, so that the mean time occupied in lighting a subscriber's lamp is ⅛ second, every segment having its own lamp. If there were four wipers in switch C, a subscriber with a lamp on every multiple section therefore occupies a maximum of $\frac{1}{4}+\frac{1}{8}=\frac{3}{8}$ second from the moment of lifting his receiver to the appearance of his signal at the operator's position. As the operator has only this call to attend to, the subscriber is answered in ½ to 2½ seconds. This is the minimum, and is the time occupied in the case of all calls following one another at intervals of at least 1½ to 2½ seconds, that is, for by far the greater number of calls. If it should happen that two subscribers on the same switch C lift their receivers within an interval of 1½ to 2½ seconds, the subscriber whose contact is nearer to the wiper is answered first. If 10 out of the 100 subscribers on the same switch C lift their receivers at the very same instant—a case that is scarcely possible—assuming four wipers arranged at right angles, the maximum time a subscriber has to wait is $2.5+2.5+1.25+0.25=6.5$ seconds, the average time being $2.08+0.12=2.20$ seconds.

Comparing this with the case of a manual exchange, suppose 10 subscribers on one operator's position to call simultaneously, while the adjacent operators are also busy, then the minimum waiting time will be 54 seconds for the last subscriber, on the assumption that every call takes 6 seconds to complete. It is readily seen, therefore, that the introduction of the rotating switch actually increases the rapidity of the service to a very considerable extent, and that the automatic and continuous distribution of the traf-

fic effects a great economy, not only in the operator's time, but also in that of the subscriber, who in the ordinary common-battery system is frequently called upon to wait, on an average, over 10 seconds, and sometimes 30 seconds or more. As for reliability, it is evident that 100 rotating switches each with 100 subscribers' connections, are far more reliable than 10,000 distributors individually allotted to the subscribers. The switches *C, D,* are, moreover, instruments of the utmost simplicity, as the armatures make only one to-and-fro movement for every call. This simplicity is in striking contrast with any system involving a single distributor for every subscriber. In a device of this kind, giving a subscriber access to, say, 60 operators, the armature of the driving magnet has to make a maximum of 60 or an average of 30 steps for every call. This means not only greater wear and tear, and considerable maintenance cost, but also increased liability to breakdown. On the other hand certain kinds of trouble in a rotating switch may affect the whole group of subscribers, say 100, connected to the switch, although this eventually is easily met by the provision of spare switches by which the damaged apparatus can be replaced in a few seconds.

There are two further points which illustrate the superiority of the continuously rotating switch over the step-by-step device of individual distributing apparatus. In the latter the source of motion is of course electromagnetic, because the subscribers' calling relay is all that is available for the operation of the driving magnet. In the continuously rotating switch the source of movement for the wiper is purely mechanical, and in the completion of a call the making and breaking of four electrical contacts are the only actions involved, as compared with an average of 30½ or a maximum of 61 contacts in an individual system with 60 operators. The second point is this: The contact surfaces of the wipers in the rotating-switch system are constantly rubbing against the contact rings, and are therefore self cleaning. The contacts, on the condition of which the working of any system of this kind essentially depends, are therefore always in good condition, whereas in the individual system, the distributor contacts of a subscriber who makes little use of his telephone, may be covered with dirt and dust, and so interfere with successful operation unless constant and careful attention is given to every contact. As there are about 600,000 wiper contacts in an exchange of 10,000 subscribers and 60 operators, this means a heavy maintenance charge, and is in addition a source of uncertainty and inefficiency of the whole service.

Referring to the diagram and to the foregoing remarks, it will be seen that the application of a selector switch distributor system to an existing common-battery installation offers no serious difficulties. The existing individual line relays are removed and replaced by one calling relay for every 100 subscribers. The same type of relay may be used for the new equipment. The terminals of the subscribers' lines are connected to the switches *C*. The answering jacks and calling lamps are removed, and the space previously occupied is utilized for the increased number of lamps in such a manner that the new lamp strips are inserted between the jack strips. The lamps are connected to switch *D*. All the listening keys are provided with additional contacts connected with a relay common to all the keys of a position. The only difficulty is the installation of the additional lamps. A new pattern of signaling lamp has, however, been recently brought out, requiring considerably less space that the usual lamps, and enabling the required number to be easily placed in the space at disposal. It will thus be seen that the installation of automatic traffic distributing plant in a manual telephone exchange of the ordinary common-battery pattern requires very few alterations to the existing equipment. The change may easily be effected gradually so that no interruption is caused to the service.

In considering the cost of the system, it is, of course, necessary to take into account the additional apparatus required. The individual line relays are, however, eliminated, and replaced by one for every 100 subscribers, so that in a 10,000-line exchange, 9,900-line relays, with accessories, cables, wiring and racks, are saved. The most important item is, however, the saving in the multiple. At Stockholm and Rotterdam, where manual traffic distribution by *A* operators is in operation, a saving of nearly 50 per cent of the multiple has been accomplished, and as automatic distribution is considerably more efficacious at least the same saving should be expected. The calling lamps mentioned above take only 0.02 watt, or 1/300 of the energy required by the ordinary type used in common battery exchanges. Hence there is a considerable diminution in the total operating current, and a possible reduction in the lamp cables to about one-tenth of their former weight. This diminution of apparatus and accessories is also accompanied by a corresponding saving in floor space, especially in connection with the reduced multiple. Against these savings, the equipment is increased by the rotating switches and the additional lamps. The space occupied on a wall by the former does not exceed a few square yards, and the latter require no additional room at all. There is, therefore, very little to offset against the saving mentioned.

The conclusion is reached that an existing exchange, having reached the limits of its capacity and requiring immediate extension, may be maintained in service for a further period by the introduction of automatic traffic distribution. From the point of view of cost, the elimination of the individual line relays alone may cover the cost of the rotating switches and additional lamps, and the saving in multiples, cables, current consumption and floor space all remains as pure gain. The saving in operators' wages is roughly illustrated as follows: In an ordinary 10,000-line exchange, in which the whole traffic is handled by *A* operators, a staff of 130 operators is required. In an exchange of the same size with manual traffic distribution, the required number is 109, 36 of these being *A* operators. As, in the system described, the work of these operators is done automatically, an exchange of this kind requires only 109—36=73 operators, that is, at least 57 less than in an ordinary exchange.

To sum up, the advantages realized by the above described selector switch system for the distribution of traffic in a manual common-battery telephone exchange are as follows: *A. Exchange Equipment.*—(i.) Considerable economy, resulting from (*a*) elimination of individual line relays (*b*); reduction in the number of multiple sections by 40 to 50 per cent; (*c*) reduction in the necessary floor space to such an extent that an otherwise imminent extension may be postponed indefinitely, permitting the use of existing plant for the remainder of its useful life; (*d*) low energy consumption for signaling; (*e*) considerable saving in the exchange wiring, on account of the reduction in multiples and smaller signaling currents. (ii.) Simplicity and reliability of the additional apparatus. (iii.) Very little alteration to existing circuits, the most important item being the fitting of extra contacts to the listening keys. *B. Quality of Service.*—Great improvement, as compared with the ordinary common-battery sys-

tem, for (*a*) rapidity, the waiting period for every subscriber being reduced to a few seconds; (*b*) equality, the deficiencies of any one operator not being confined to one particular group of subscribers; (*c*) impartiality, the same subscriber not being attended to always by the same operator, but probably by a different operator after each call. *C. Operating.*—(i.) Uniformity of traffic pressure, the whole of the incoming calls being at every moment equally distributed over the whole operating staff on duty. (ii.) Reduction of the operating staff by 50 per cent, compared with the ordinary system, as far as local traffic is concerned. (iii.) Changes in the number of operators on duty are effected by steps of one operator. (iv.) Concentration of the staff, during periods of light load, to one, two or three adjacent multiple sections. (v) Equal strain at any time on each operator. (vi.) Highest efficiency of operator's work. (vii.) Most effective and impartial supervision, each operator's work being graphically and automatically recorded. (viii.) Facility of comparisons and selection of operators. (ix.) Team work is always automatically enforced, and does not depend upon personal supervision. *D. Maintenance.*—Appreciable reduction in maintenance work and costs, owing to elimination of line relays and reduction of the multiple. The cost of driving the selector switches is largely counterbalanced by the saving already mentioned and the low cost of signaling current.

Bases of Reports of Government Ownership

Inquiries made at Washington by a representative of the *Electrical World* indicate that the report that the Washington administration is to embark on a policy of government ownership of telephone and telegraph lines, is based primarily on an investigation now being made by Congressman David John Lewis, of Maryland, rather than on the present attitude of the administration itself. This investigation is being conducted wholly on the initiative of Congressman Lewis and has reached a point where his conclusions and recommended course of action are nearly ready for announcement.

Up to this time the complex subject of government ownership of telephone or telegraph lines has not been considered by the present administration so that predictions as to future possible action are not justified. So far as it could do so, the administration has been bending its energies toward the passage of the tariff bill, with the support of its party in Congress. Now that this part of its program has been carried out, it will undoubtedly turn a similar close attention to the pending currency bill. When some disposition is made of this measure, other matters will, of course, be taken up, but so far what they will be has not been decided.

If a policy of government ownership of telephone and telegraph lines is urged, it is believed that the exponent of such a doctrine among the President's advisers would be Postmaster-General Burleson. He has a plan in mind to recommend the extension of government activities in this direction, but it is nebulous. Such a plan would probably be submitted first to the President, and in circles in close touch with the administration, it is stated that the matter has not been considered in this way. The fact that such a project has not received consideration except, perhaps, within the post office department, is not regarded as conveying any assurance as to the position of the administration either in favor of or against a policy of this nature. It simply has not been considered.

The extension of government service to the telephone and telegraph lines has been recommended by two predecessors of Postmaster-General Burleson. Both Mr. Wanamaker and Mr. Hitchcock, the immediate predecessor of the present incumbent of the office, favored it. The annual report of the postmaster-general will be prepared and submitted before the close of this year, but it is impossible to ascertain whether or not the indefinite ideas now in mind will take such shape that they will be presented as formal recommendations in this document.

Some color has been given to the reports that the postmaster-general is interested in the matter by the announcement that the Alaska military cable and telegraph system will be transferred from the war department to the post office department. This system comprises a total of 2,500 miles of submarine cable, 1,200 miles of land service and ten wireless stations. Major Charles McKay Salzman, of the Army Signal Corps, has been transferred to the post office department temporarily in connection with the proposed change in control of this property. The war department wants to be relieved of its duty with respect to the Alaska lines, pointing out that they are not needed now for purely military purposes. Whether any particular significance with respect to the larger subject of government control of other lines can be attached to this matter, cannot be learned in Washington.

The administration and members of Congress who are especially interested in the parcels post system are unquestionably pleased over the large volume of business which this departure has brought to the post office department. When this service was started it was strongly competitive with the business of express companies, and subsequent development has made it still more so. The effect of the parcels post system was to make the government a competitor of the express companies to an extent that is disastrous to the revenues of those companies.

The investigation of telephone and telegraph matters which is being conducted by Congressman Lewis, has been under way since March of the present year. It is based primarily on available statistical and report data regarding companies engaged in these services, supplemented to some extent by personal research. It is not confined to companies in this country, but has been extended to the systems of other countries; it embraces rates, service, capitalization and other factors of importance. Congressman Lewis has been much interested in the extension of the parcels post system, and it was his study of this matter that led him into the analysis of the telephone and telegraph situation. It is not possible to learn just what use will be made of the data accumulated by Congressman Lewis, but they will be embodied in an exhaustive report.

The Telephone as a Nurse Girl

Jay Houghtaling, of the Western Electric Company's telephone sales department at Minneapolis, thinks he has discovered a brand new use for the telephone. A friend of his, a lawyer in St. Paul, is a great believer in fresh air, and he and his wife use a sleeping porch the year around. During the winter months, however, they do not want their baby to sleep out of doors. Consequently, they have rigged up a telephone connection with the transmitter by the baby's crib indoors; the receiver, with a megaphone attachment, is near the bed on the porch. In case the baby cries, the faithful telephone announces the fact to his parents. At the same time, the baby is not exposed to the wintry blasts.

The idea is the lawyer's own, although he bought the various parts from the Western Electric Company.

The Telephone Scrap Book

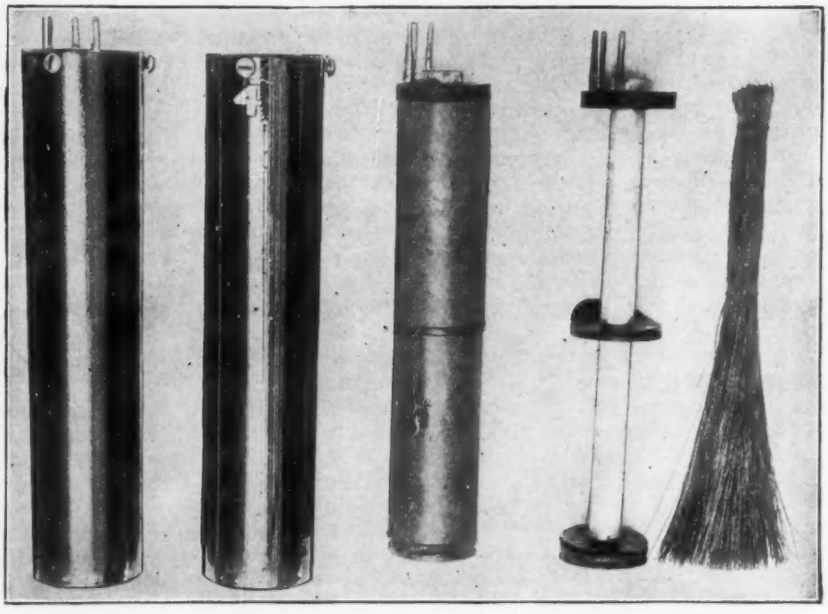
Function of Retardation Coils

IN telephone circuits, it is necessary to handle not only high frequency voice currents, but also the low frequency alternating current used for ringing and the direct current used for supplying talking current to the transmitters and for operating relays and other signaling devices. So that direct current may not be wasted in the circuit, it has been found necessary to use a condenser. In a somewhat similar manner, the retardation coil is used to prevent waste of talking current and, in combination with the condenser, is used to separate alternating from direct current under the great variety of conditions which are found in telephone practice, says the *Western Electric News*.

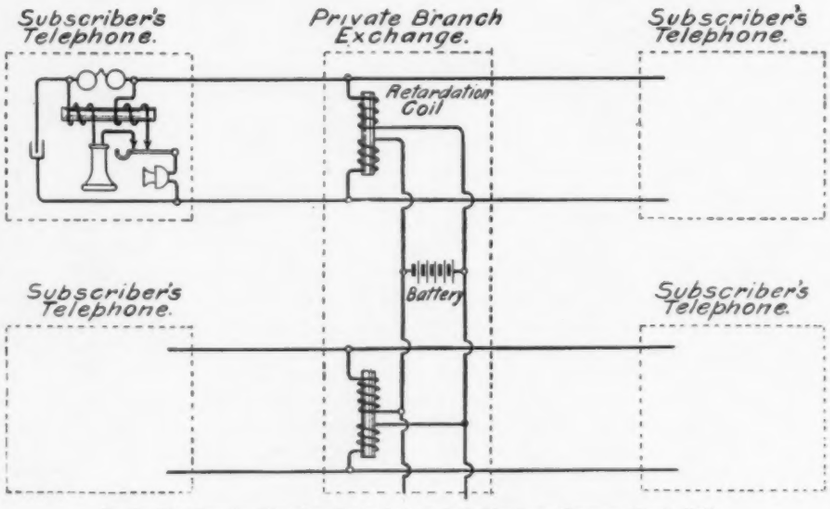
A retardation coil consists essentially of a coil of insulated wire wound around an iron core and provided with suitable terminals. The coil is often placed in an iron shell, which serves to protect it from mechanical injury, and prevents magnetic interference with adjacent telephone apparatus.

The electrical effects of a retardation coil are, in general, exactly opposite to those of the condenser. For example, the condenser prevents the flow of direct current, while the retardation coil offers merely a slight resistance to direct current, such as would be offered by a similar amount of straight wire. The condenser allows alternating current to pass through it, and its impeding effect on the alternating current decreases as the frequency or rapidity of the alternatives increases. The retardation coil, on the other hand, has a retarding effect or impedance on alternating current which increases as the rapidity of the alternations increases, and becomes very high at frequencies corresponding to those of the human voice. In short, the retardation coil provides a path for the flow of direct current, at the same time offering a very high impedance to the flow of alternating current. The various functions which the retardation coil performs in telephone circuits make use of both of these properties. A few typical applications of the retardation coil in telephone and telegraph circuits follow:

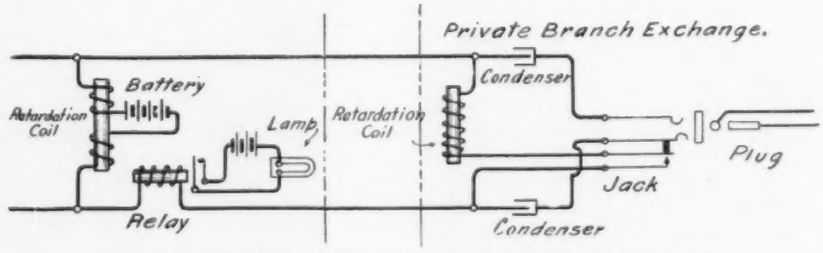
One of the principal uses of retardation coils is in connection with a central office storage battery and charging generator. The current supplied by an ordinary direct current generator is not absolutely continuous, but contains a



Parts and Assembled Retardation Coil.



P. B. X. Circuit, Showing Retardation Coil Used as Battery Feed Coil.



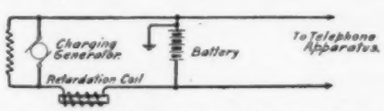
P. B. X. Circuit, Showing Retardation Coil Used as Relay Holding Coil.

small element of high frequency current which would produce noise if allowed to enter the battery. In this connection, therefore, the function of the retardation coil is to prevent these noise producing currents from entering the battery.

The coil is also used to allow both telephone and telegraph currents to be sent over a single wire with a return circuit through the ground. In such a circuit, a condenser is placed in series with each telephone instrument, and a retardation coil in series with each telegraph instrument. The condenser allows the high frequency talking currents to flow freely through the telephone instrument, but cuts off entirely the direct current impulses of the telegraph instrument. The retardation coil, on the other hand, keeps the telephonic current from being wasted by passing through the telegraph instrument, but at the same time permits a ready flow of the telegraph impulses.

A more common use of the retardation coil is in private branch exchanges as a battery feed coil where it may be that a number of different conversations are being carried on at the same time by means of transmitter current supplied from a common battery. For this purpose a double wound retardation coil is used. It allows direct current to pass to the several transmitters but prevents the talking current from being wasted by passing through the battery. By keeping the talking currents out of the battery, the retardation coil also prevents one pair of subscribers from overhearing the conversation of other subscribers who are talking on the same common battery.

Another function of the retardation coil and one



Circuit Showing Retardation Coil Used as Choke Coil.

which necessitates a more complicated circuit is its use as the holding coil for a relay. This is to notify the central office operator that the circuit with which the retardation coil is associated has been connected to another line by means of the plug shown at the right of the diagram. When this plug is inserted in the jack, it closes a contact which connects the retardation coil across the line. This allows current to flow from the central office battery through the relay, causing the latter to pull up and open the local circuit through the lamp. The going out of the lamp indicates that the connection has been properly completed. In this case the retardation coil prevents the waste of talking current passing over the line and at the same time allows a flow of direct current sufficient to hold up the relay. In this case, the central office battery is cut off by means of condensers from the apparatus attached to the plug.

By various combinations of retardation coils and condensers, the telephone engineer is able to operate the very complicated signaling system made necessary by the development of the modern telephone exchange.

A Mine Rescue Telephone Equipment

THE development of practical telephone equipment for mine rescue work to supplement the oxygen apparatus now in almost universal use marks a great step forward in providing ways and means for preventing the great loss of life which, in years past, followed every mine disaster. The great value of the oxygen helmet, which permits its wearer to enter a mine and remain in the presence of smoke and poisonous gases for hours at a time without danger of being overcome, has been evidenced by the hundreds of lives which have been saved through its agency. The iron box mine telephone has also proven to be of inestimable service in protecting lives and property. In fact, the laws of a number of states in which mining operations are conducted, include statutes making compulsory the use of telephones underground, says the *Scientific American*.

Attached to the same harness with the transmitter is a water-case receiver equipped with a leather head band to clamp it firmly to the ear. The head harness, with its receiver and transmitter, is so constructed that it will not interfere with the operation of any of the various types of oxygen apparatus on the market. The head equipment, furthermore, is extremely light and does not in any way inconvenience its wearer.

The telephone apparatus used by the directing party

A Mine Rescue Telephone Equipment. The Transmitter Is Strapped Against the Throat So That the Rescuer Talks Not with His Mouth, but with His Neck.

at the outside of the mine is a standard switchboard set consisting of a chest type transmitter and head band receiver.

Test of Concrete Poles

REPRESENTATIVES of the New York Telephone Company, the Rochester Telephone Company and the Railway and Light Company gathered in the Atlantic avenue yards of the latter company at Rochester, N. Y., to witness some breakdown tests of concrete poles. The poles, thirty feet in height, were constructed with a view to use in telephone work. Four poles were used, constructed one, two, three and four months ago.

In testing the poles a dynamometer was used. The dynamometer is an instrument that measures the foot

pounds of pull registered by a tackle. Wires were attached to the tips of the poles and to a point in the ground about one hundred feet away. Tension was then put on the poles through the dynamometer by means of rope and tackle, and the deflection of the poles were noted and recorded from the start to the breaking point. It was found that the poles more than came up to their calculated strength in all respects.

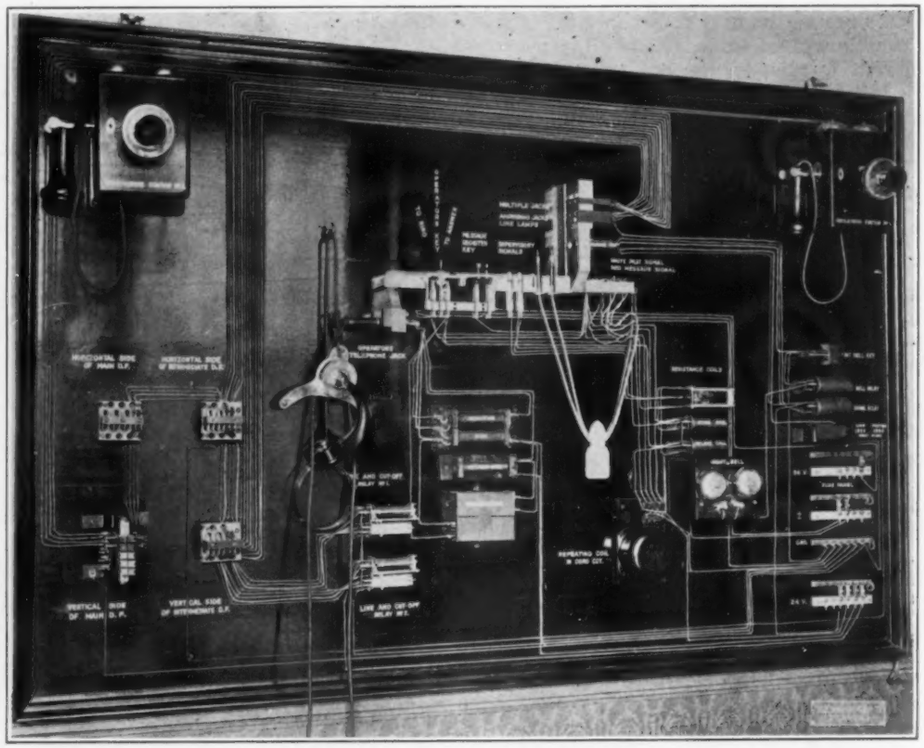
The representatives of the companies were as follows: New York Telephone Company, C. S. Davis of New York, E. A. Cooper of Buffalo, Noel E. Lamb of Rochester; Rochester Telephone Company, J. W. Morrison, John Haley; Railway and Light Company, J. O. Montiguanii, T. M. Quinn, Thomas H. Yawger.

Graphic Explanation of Circuits

ON the office wall of Commercial Manager George Spaulding of the Mountain States Telephone and Telegraph Company at Denver hangs the telephone display board shown in the accompanying illustration, for which we are indebted to the *Mountain States Monitor*. The ingenious arrangement was devised by Mr. Spaulding for the purpose of giving a graphic illustration in the simplest possible form of the operation of the telephone.

Standard equipment and apparatus is used throughout, and, in explaining to visitors the operation of the telephone, Mr. Spaulding actually traces a call from one of the telephones to the other, following it through the wires, the distributing frames, fuse panels, coils, relays and switchboard to its destination. It is planned before long to have similar apparatus in use in other parts of the company's territory.

Even the simplest of telephone circuits is difficult to explain satisfactorily to anyone without technical training, and the arrangement of this visual circuit is very commendable. It should clear up a great many of the puzzles which burden the mind of the telephone student, and do so in a very interesting way. Its explanation to curious members of the lay public would also prove a good investment of time, without doubt.



Telephone Circuit Display Board.

Storm Damage in Cleveland

TUESDAY, November 11, 1913, marks the date of the worst storm ever recorded in the history of the city of Cleveland, Ohio. With a heavy snow falling, a terrific gale swept the city, leaving a tangle of wires and debris scattered through the streets of the city. Masses of wires and broken poles suspended in the air, offered serious difficulties to the operations of street cars. Live wires strewn on the streets and sidewalks made transportation so perilous that the telephone, telegraph and electric light companies were obliged to discontinue service, leaving the city in darkness and without means of communication.

More than 20,000 telephones were out of order in Cuyahoga county, and officials of the telephone companies estimate their loss at between $350,000 and $400,000.

The Bell Telephone Company estimated that between 10,000 and 5,000 telephones were found out of service, and the Cuyahoga company placed its disabled telephones at about 10,000.

Because of the obstructed condition of the city thoroughfares, it was impossible to make repairs. Weather conditions were so intense that poles and cables could not be hauled to the spots where they were needed. More than six hundred men were at work during the storm, repairing the damage. Notwithstanding the large force, little service was restored immediately.

Telephone operators were obliged to remain at the companies' offices, where meals were served, and proper accommodations prepared for continuous service in relays.

The damage caused was so great that the companies found it necessary to order cable and wire, in order to replace and repair the many instances of existing troubles.

Throughout the entire storm, thanks to the special efforts of the telephone and telegraph companies, and the loyalty of their employes, the city had at least some telephone service where all other service was at a standstill.

Induction Locator for Troubles

IN Figs. 1 and 2 are shown two improvements made by Robert T. Creel of Spokane, Wash., in the so-called "wireless" apparatus for locating trouble in cables.

Fig. 1 shows a small condenser placed either in par-

allel, or in series with an exploring coil and receiver. It serves to neutralize the retarding effect of the two inductances and hence increases the current in the circuit. While the proper capacity for a condenser in series can be determined by the formula: $C = \frac{1}{4n^2n^2L}$, in which n = the frequency and L the inductance, the difficulty of assigning the proper values for n and L makes it usually

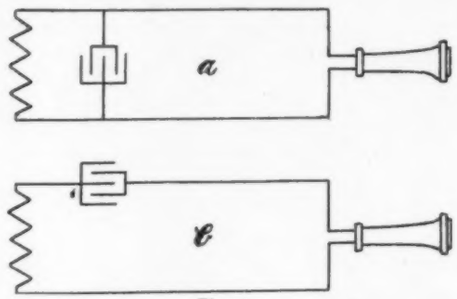


Fig. 1.

more convenient to do this by experiment. Using a small coil of 1,000 turns, Mr. Creel obtained excellent results with about one-third of the sheets from a 2 mf. condenser, which were rolled and placed in the case of a pocket flashlight. To this was attached a cord and plug which fitted into a small jack in the coil circuit. The condenser may thus be kept in the pocket and plugged in only when needed. This arrangement increased the loudness of tone in the receiver about ten per cent.

Fig. 2 is the circuit of an interrupter used for locating trouble; l is a 12-volt switchboard lamp in series with the secondary and outside circuit. The advantage of the lamp lies in the fact that the tester knows at once if the trouble clears out. It frequently happens that a crossed or grounded line gives a steady deflection on a voltmeter, but on the application of the higher voltage alternating current from an interrupter, the trouble disappears, temporarily or permanently. Also, the tester soon learns to know how brilliantly the lamp must burn in order to

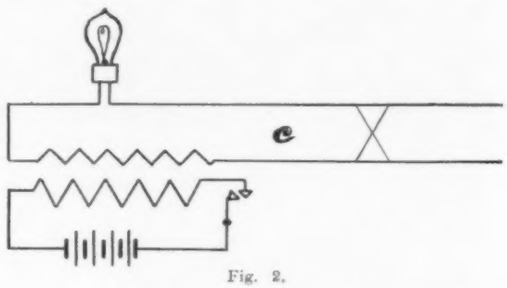


Fig. 2.

permit of a location with his particular coil. When the lamp burns dimly on a closed circuit, it indicates either the necessity of added dry cells on account of high resistance in the external circuit, or that the cells in use are exhausted.

A Reading Optophone

IT is well known that the conductivity of selenium is capable of following fluctuations of light with extreme rapidity, as shown by the successes already attained in the photophonic transmission of speech, says E. E. Fournier D'Albe in the London *Electrician*. The "instantaneous" change of conductivity under the action of light is approximately linear, so that the amplitude of oscillation, with a given intensity of light, is nearly inversely proportional to the frequency. This would mean that in converting light oscillations into telephone sounds the higher notes would be feebler than the lower ones. But this is largely counterbalanced by the resonance of the ear and of the telephone membrane, and it is found in practice that the maximum audibility occurs somewhere about a frequency of 1,000 waves per second.

The "reading optophone" consists essentially of a selenium preparation illuminated by a line of light broken up into dots. The light of each dot is intermittent, and each dot has a different frequency. Thus, in one apparatus actually constructed, the frequencies of the eight dots composing a line 8 cm. long are in the ratio of the numbers of the diatonic scale, viz., 24, 27, 30, 32, 36, 40, 45, 48. Large type printed on gelatine or other transparent material, when interposed between the source of light and the selenium, breaks up the line into dots differing in tone according to the shape of the letter, and with a little practice the letters of the alphabet are easily recognized and "read" by the ear.

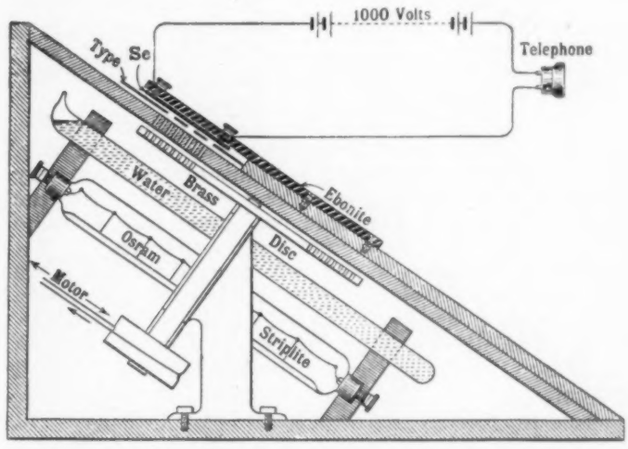


Diagram Showing General Arrangement of Reading Optophone.
Bugs That Eat Fuses.

The arrangement adopted is shown in the diagram. The line of light is furnished by an Osram "striplite" of 100 c. p., which is concentrated by means of a cylindrical water lens upon a revolving perforated brass disc provided with eight circles with the numbers of holes specified above. The disc is spun at about 20 or 30 revolutions per second by means of an electric motor. The line of dots of eight different frequencies exists, therefore, just at the surface of the brass disc. As it is not feasible to bring the transparency to be "read" into contact with the brass disc, the luminous dots are transferred to the upper side of a wooden partition by means of a set of glass rods with flat ends embedded in the wood opposite the luminous dots. The flat ends of the rods are flush with the surface of the board, and the transparency can be safely and conveniently slid across them.

The selenium bridge *Sc* is mounted above the transparency with just sufficient clearance to allow for free displacement. The luminous dots transmitted by the type or other transparency impress their frequencies upon the selenium, and the latter gives a musical note corresponding to each dot, even when the beams of light overlap on to the same portion of the selenium. When that

occurs with neighboring notes, "beats" are heard, just as they are when neighboring notes on the piano are struck together.

Since the only thing perceived is the alternation of the light and darkness, and since that takes place hundreds of times per second, the effect of light is instantaneous, and the "lag" or inertia so unpleasantly associated with selenium is entirely absent.

The smallest type successfully read so far is an inch high, photographed white as a transparency. But it is quite unmistakable. The two vertical strokes of *H* or *M* give a chaos of notes, the middle stroke of *N* gives a falling gamut, the three horizontal strokes of *E* give a chord, and the curved lines of *O* and *S* give characteristic flourishes of sound. The alphabet of capitals can be learned in about an hour, and once the sounds are learned, the process of reading may become as rapid as that of reading by sight.

The selenium bridges used have a high resistance, amounting as a rule to several megohms. They require an e.m.f. of 1,000 volts for the best results. The telephones used were a pair of 4,000 ohms each.

Since type of any size whatever can be put into the shape of a white-on-black transparency by means of photography, and simultaneously reduced to the proper size, the reading of type by the blind is now reduced to a matter of photography. This has over the Braille type the advantage of being generally legible, though it is doubtful whether in the matter of cost the optophone can as yet compete with raised type.

It is obviously desirable that ordinary black-on-white type, printed on paper, should be read optophonically. Some experiments I have made in this direction are very encouraging. A strip of slate long enough to cover the line of dots was cut out and perforated with holes so as to let the upper ends of the glass rods project just beyond its surface. The slate was covered with selenium and sensitized. A glass plate was laid over the wooden "reading desk" and the glass rods, and a printed advertisement of large type was placed face downwards on the glass. The white paper produced a chaos of all the notes, which broke up into more or less well-defined notes as the black letters were passed over the rods. But the loudness and distinctness so obtainable were greatly inferior to what they are by transmitted light. Still, the solution is there in principle, and it is only a matter of making the type smaller and the effects louder and more distinct. The blind will then be able to read everything as well as the sighted.

Needless to say, any succession or combination of musical notes can be picked out by properly arranged transparencies, and I have succeeded in transcribing a number of musical compositions in this manner, which are, of course, only audible in the telephone. These notes, in the absence of all other sounding mechanism, are particularly pure and free from overtones. Indeed, a "musical optophone," worked by this intermittent light, has been arranged by means of a simple keyboard, and some very pleasing effects may thus be obtained, more especially as the loudness and duration of the different notes is under very complete and separate control. As this, however, was not the immediate object aimed at in devising the optophone, it need not be further enlarged upon here.

In Brookline, Mass., Boston's fashionable suburb, there are 91.3 telephones to every 100 families—nearly saturation point.

Bailing Water Out of Post Holes

THE accompanying illustration shows an apparatus that I have designed for bailing water out of pole holes, says S. J. Axford, supervising foreman of the Englewood, N. J., district of the New York Telephone Company, in the *Telephone Review*.

Pail with Valve in Bottom

In practical operation it has proven extremely useful, and what is equally important, economical. It is not at all cumbersome, and consequently lends itself readily to easy transportation.

The bucket is 10 inches high, 10 inches in diameter at the top, and 8 inches at the bottom. The bottom is fitted with a double valve which opens from the pressure of water below, and is closed by the weight of water within the pail as it is lifted.

Ford Magneto in Testing Telephone Lines

HERE is a picture from *Popular Electricity* showing how a Ford automobile magneto may be used to make field tests for telephone and telegraph companies, thus adding to the usefulness of that popular machine.

Two testers start out in a machine and run up beside a telephone or telegraph pole, as the case may be,

Testing a Telephone Line with an Automobile Magneto.

and attach one end of a wire to the magneto and the other end to the wire to be tested on the pole. Another wire is run from the magneto to the telephone instrument of the person making the test. Another wire is then run direct from the instrument to the wire on the pole. The engine of the car is kept running and the test is made.

Fulfilling the Contract

By Walter K. Towers

NOT infrequently, in his anxiety to close a bargain, one will agree to furnish an article or perform services to the satisfaction of the other party. Your watch is out of order; you take it to a watch maker, yet hesitate about leaving it for him to repair. He agrees to fix it to your satisfaction. You wish to purchase a silver dish of a jeweler, but you desire a monogram placed upon it, and you doubt that he possesses the artistic ability and good taste to do the work so that it will please you. He assures you that he can and will please you and that if he does not perform the task to your satisfaction you need not take the dish. You give him an order under these conditions.

You wish to have your roof fixed and, driving a close bargain, insist that the carpenter agree that he will perform the task to your satisfaction, else he need not be paid. You go to your tailor to place an order for a suit. In his anxiety to secure the order, which you seem somewhat loathe to give, he assures you that he will make you a suit that will satisfy you and that if he does not, you need not take it.

In each of these cases you have entered into a contract with the tradesman or workman, calling for the performance of certain labor and the furnishing of materials or the sale of an article. Now, suppose that in each of these cases the work specified is performed in a fair and workmanlike manner, with reasonable skill. Yet, suppose you have changed your mind in every case and no longer desire the article or the work that was done, or you feel that the work does not quite please you. Therefore, you insist that as the others took the risk of pleasing you, you are entitled to insist that they do it and if they do not you may refuse to accept the work which they have performed for you. They insist that the work is well done and that you ought to be satisfied. Your contention is that no one but yourself can say whether you are satisfied or not and that if you say you are not that settles it.

Suppose that the watch maker, the jeweler, the carpenter and the tailor all sue you, insisting that they have performed their portion of the contract and that you must make the payment agreed. Are you entitled to insist upon the letter of the contract and enforce your own word as to whether you are satisfied or not, regardless of whether a reasonable man would say that you ought to be satisfied? The answer is that in some cases you can and in some cases you cannot.

The watchmaker and the carpenter could force you to accept their work and make the agreed payment; the jeweler and the tailor would probably be forced to accept your decision that you were not satisfied, and make such other disposition as they could of the dish engraved with your monogram and the suit cut to your measure, without receiving any pay whatever from you. The distinction which the law draws between these cases is the distinction between work requiring a mechanical execution and a mechanical excellence and work designed to fit varying personal taste, as work of an artistic nature. If a brick foundation is to be built for your new shed, and is to be completed to your satisfaction, and it is completed in a substantial and workmanlike manner, and a jury of ordinary men decide that a reasonable man would be satisfied, then the law will insist that you ought to be satisfied whether you say that you are or not. So it is, also, with the repairing of the watch and the repairing of the roof. These are mechanical acts, and if the jury finds the work well and properly done, and believes in view of all the circumstances that a reasonable person would be satisfied, you will be compelled to accept the work, despite the fact that the agreement required that it should be done to your personal satisfaction. But a suit of clothes and a monogram upon a silver dish are matters involving personal taste rather than mechanical excellence. If these articles do not conform to your personal tastes you do not want them, and no one can decide that you ought to want them, for it is proverbial that there is no accounting for tastes.

It is a general rule that a contract must be performed literally. Neither party can claim to have performed the contract until he has done just exactly what the contract requires in all of its terms. The work or material to be furnished, or the money to be paid, must be supplied in the exact quantity and quality specified at the place and time specified.

Yet this rule, like all others, has exceptions, one of which we have noticed above. In certain classes of cases the law is inclined to allow substantial compliance with the terms of a contract as amounting to performance. When a matter involving many details is generally completed as specified, yet fails in details of minor importance, the law regards this as substantial performance and requires that the other party fulfill his part, though an allowance is made him to cover the items in which the work was not as specified. Thus, if a house is being built for you under contract, and is completed in accordance with the contract in all the larged details, but varies in a few lesser places, you cannot refuse altogether to accept the house, in case he sues you on the contract, but an allowance will be made amply sufficient to cover the cost of making the defective parts conform to the specifications.

What is known as impossibility of performance is stated as one of the legal excuses for failure to perform a contract. This is very likely to confuse the average person, as most of the things which we would view as "impossibilities" are not such "impossibilities" as will, in law, excuse the failure to fulfill a contract. The impossibility which will put an end to a contract must be of a sort that the parties can be deemed to have contemplated as an adequate excuse, should it chance to occur. Hardship or unforeseen difficulty, no matter how severe, will not excuse failure to perform according to the terms of the agreement. If a man agrees to paint your house in two days, it is no excuse that he finds it impossible to finish the house in two days, no matter how hard he works. Neither is it an excuse that his materials are stolen or destroyed and so he cannot proceed. Nor is it an excuse that his workmen strike, unless that is provided against in the contract. But if the house should be burned, that would amount to a destruction of the subject matter of the contract,

which is such an impossibility as will furnish legal excuse for failure to perform.

If one contracts to furnish his own personal services (not to do something that anyone may do) and dies, or is seriously injured or falls ill, no damages for failure to perform his contract may be recovered against his estate, or against him, since this is such an impossibility as furnishes legal excuse.

When one has completed his side of the contract, and not until then, may he bring legal action to force the other party to do his part. An exception to this is where the other party has definitely broken the contract in advance by word or action, as by a definite statement that he did not intend to fulfill the contract. A person who has contracted to deliver goods must have the goods specified at the time and place required. Then if the other party refuses to accept them a breach has occurred which gives to him a legal right of action. If the agreement is to sell for cash he need only tender delivery, and if the other party has not the cash to fulfill his part of the agreement there has been a breach of the contract.

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Convention of Railway Commissoners

The twenty-fifth annual convention of the National Association of Railway Commissioners was held in Washington. During the meeting the report of telegraphs and telephones was presented as follows:

Up to this time no specific method has been adopted generally as a basis for rate-making. Individual plant conditions have governed in nearly all cases and therefore we will treat the subject generally and submit some views together with what comparative statistical information we have been able to secure. That scientific making of rates has not been indulged in to any great extent can be clearly observed through the following comparison of cities, in which are located competitive plants, with cities where there is no competition:

Competition.		Population.
Chicago, Ill.	$84	2,185,283
Philadelphia, Pa.	90	1,549,008
St. Louis, Mo.	78	687,029
Cleveland, O.	72	560,663
Buffalo, N. Y.	72	423,715
Indianapolis, Ind	54	233,650
Memphis, Tenn.	48	131,105
Decatur, Ill.	30	31,140
Monopoly		**Population.**
New York, N. Y. (Manhattan)	$228	2,331,542
Boston, Mass.	125	670,585
Baltimore, Md.	174	558,485
San Francisco, Cal.	180	416,912
Denver, Colo.	138	213,381
Oakland, Cal.	84	150,174
Burlington, Iowa	72	24,324

The above comparisons raise the following questions: (1) Is a competition necessary to secure reasonable rates? (2) Are the rates charged under competitive conditions reasonable or remunerative? (3) What remedy should be suggested?

Without question competition has been the means of the public receiving service at a lower cost, but this does not necessarily mean that the rates are either reasonable or remunerative. Many companies have entered the field of competition with low rates and in a short time found it necessary to get nearer the plane of their competitor, or, in some cases, the competitor has met the lower rates, this nearly always resulting in a consolidation of the two plants within a short period of time. Where competition exists the public is in a state of semi-belief that it is receiving service at as low a rate as it is possible for the companies to render the service. The activity of the competitors in systematic advertising and the soliciting of new business through well trained men all tend to stimulate the ever smoldering fire of public discontent, which, no matter how carefully nursed, breaks forth from time to time, causing renewed activity and in many instances, a reduction in rates by one or the other competitor and in many instances by both. Surely scientific lines are not followed under such conditions.

A remedy for these conditions is being sought by both the public and the utility operators. There can be no question but that duplicate plants in the same city is a waste of money and a public burden.

State control of such utilities offers the best remedy for these conditions. Government control has not proved entirely successful. For example, the Japanese government had on March 31, 1911, 45,000 persons on the waiting list for telephone service; it appropriated $12,000,000 for expansion for the year ending March 31, 1913, and was considering an appropriation of $25,000,000 for the next five years ending March 31, 1918. There are now 28 states exercising control over telephone utilities. However, the work has just begun. The railroads have consumed so much of the time of the various commissions that the telephone situation has been considered, to a large extent, more or less incidental, but, when it is considered that the number of telephone conversations per year outnumber the passengers carried by the railroads over five to one, more consideration should be given the subject. The details of the telephone business are far greater than those of the railroad business and the average commissioner would rather wrestle with ten big railroad cases than one small telephone case.

Interesting figures have been compiled showing the telephone development in 115 cities having a population of over 50,000 as of January 1, 1913. The first fourteen cities are herewith enumerated:

Name of City.	Stations per 100 population.	Estimated population of Exchange area.	Total Stations.
San Francisco	23.7	454,000	107,702
Spokane	20.4	105,300	21,411
Omaha	20.1	166,000	33,358
Dallas	19.1	114,700	21,881
Des Moines	16.7	96,000	16,074
Oakland, Cal	16.4	246,000	40,267
Salt Lake City	16.0	116,000	18,503
Denver	15.9	222,000	35,365
Seattle	15.7	285,000	44,810
Wichita	15.6	57,400	8,938
Houston	15.4	106,000	16,477
Oklahoma City	15.3	65,000	9,919
Portland, Ore.	15.3	255,000	39,101
St. Joseph, Mo.	15.2	79,800	12,094

The report then gives some world statistics of the telephone for 1911.

January 1, this year, the Interstate Commerce Commission promulgated its classification of telephone accounts and nearly all of the telephone companies, as well as the state commissions, are endeavoring to follow the system prescribed as nearly as possible. The system seems at this time to be complete and so arranged as to give any class of information desired.

There is little to say relative to telegraph rates and service. From investigation there is apparently less complaint against this utility than any other. With perhaps the exception of the American Telephone & Telegraph Company assuming control of the Western Union Telegraph Company there has been little change in this utility.

The legislative council of the Straits Settlements recently appropriated $6,244 for improving certain telephone lines in Penang, which are owned and operated by the postoffice department of the Straits Settlements and are under the supervision of the postmaster general at Singapore. The exchange at present consists of 495 connections.

Gathering Data for Interstate Commission

By W. S. Vivian

W. S. Vivian, Secretary Independent Telephone Association of America.

IT has been definitely decided that the Independent Telephone Association of America should take an active part in securing statistics to be furnished to the Interstate Commerce Commission to enable that body to come to a correct conclusion in the investigation which is understood to be now in progress; and the Association wants specific information from operating companies answering the following questions:

No. 1—Give specific figures from your own records showing percentage of messages terminating within fifty miles of point of origination; percentage from 51 to 75 miles of point of origination; percentage from 76 to 100 miles of point of origination, and percentage over 100 miles. Ninety-five per cent of messages classed as toll are destined to points within 50 to 75 miles of originating point.

No. 2—Give specific instances of Bell methods observed by you tending to show extravagant expense in constructing, maintaining and operating caused by non-resident management; independent local companies operate at less expense than local exchanges controlled at a distance by the American Telephone and Telegraph Company.

No. 3—Bell competitive methods.

(*a*) Give specific instances where the Bell company has furnished service below cost or free of charge to destroy competition.

(*b*) Give specific data as to instances where independent securities have been discredited by misrepresentations, emanating from Bell sources.

(*c*) Give specific instances showing unfair discriminations in long distance rates from competitive points to other competitive points, and to non-competitive points at same distance from originating point.

(*d*) Give specific instances where Bell companies directly or indirectly have caused or been responsible for right-of-way obstruction.

(*e*) Give specific instances where Bell companies have interfered with independent service by means of cutting wires, grounding, or placing a short on circuits, or placing any obstacles on wires which would interfere with transmission.

No. 4—Results of competition. Give specific facts which will cover the history of your company, showing the incidents and causes leading up to its organization, and its experience from a competitive standpoint sense, which will show the benefits of competition, including:

(*a*) The date of organization of your company.

(*b*) Names of individuals who organized your company.

(*c*) Tell concisely a story of your own telephone experience.

(*d*) Why was your company organized?

(*e*) What have been the results to the people of your community?

(*f*) What is the percentage of increase of service which the people of your community now enjoy as compared to the quantity of service they were receiving at the time competition began?

(*g*) What dividends have been paid and for how long?

(*h*) What rates were charged by Bell companies before

(*i*) What rates have been charged since your company was organized?

(*j*) How much, in dollars, has competition saved the people of your community because of reduced rates or any other reason which you may think of?

(*k*) What kind of service was furnished before competition?

(*l*) What kind of service has been furnished since by the Bell company, since your company was organized?

(*m*) What methods did the Bell company use before your company was organized; that is, was it courteous, accommodating and efficient, or arbitrary, oppressive and repressive?

(*n*) What methods have Bell companies used since your company was organized?

(*o*) If there are two operating companies in your town, give percentage of duplication of telephones.

No. 5—In addition to the foregoing, give any other information that you may be able to think of which will have any bearing in preparing a history of the telephone industry, and which will be of any assistance or interest in the investigation now being conducted by the Interstate Commerce Commission.

Every independent telephone company in the United States should be actively interested in the situation that is now confronting them, and should see to it that there is no delay in compiling this necessary information and getting it to us at once.

The Independent Telephone Association of America is going to be of practical assistance to every operating company in this country, right from its inception, provided, of course, that the companies on their part avail themselves of the opportunities offered by becoming members of the association, and if there is any lack of knowledge as to how to proceed in this manner, write the secretary at 1014 New York Life building, Chicago, and you will immediately be furnished with membership blanks, by-laws, resolutions, and other information pertinent to the situation at this time. We want every company to *do it now.*

The Association is having printed 20,000 copies of a booklet on the subject of "Fundamental Principles and National Trend of Telephony," by B. G. Hubbell. The subject matter of this booklet has been unanimously adopted by the board of directors of the Association as a statement of fact. The booklet will be the same size as the Association's By-Laws; that is, 6 by 3½ inches. The Association intends to furnish them at cost to operating companies which may want them in quantities.

It is an excellent time indeed for the independents to work out a plan for closer business affiliations. We do not mean that there should be a general or national amalgamation in one company, or anything like it. That would sacrifice the most valuable asset the independents now have, local support, local supervision, and local adaptability, but it should be easily possible to retain all these and yet estabish a cohesive organization, stretch-

INDEPENDENT CONVENTION.

The Independent Telephone Association of America will hold its first annual convention at Hotel La Salle, Chicago, Tuesday, Wednesday and Thursday, January 20, 21 and 22, 1914, to discuss matters of great importance to independent telephony. All independents should attend.

ing from one end of the country to the other, an organization which, without destroying individual control or management, would yet bind all of the independents indissolubly together. . . . Today the independents can best advance their own cause by getting as close together as possible. If nothing else, the efforts the Bell is making to disintegrate the independents' organization here and there should stimulate such a getting together. . . . From every standpoint, then, there is a reason for the independents to get together and get together now.

The foregoing words were penned by Paul Latzke, editor *Telephone Securities Weekly*, in its issue of May 2, 1908. The occasion was the confidential report which L. N. Whitney, general superintendent for the Central Union Telephone Company, had sent to Bell headquarters in August of 1907, in which Mr. Whitney frankly stated the situation as he saw it. At that time the Central Union Telephone Company owned less than 15 per cent of the telephones in Indiana; 30,150 Bell telephones and 174,850 independent telephones.

VICE PRESIDENT'S OFFICE
THE TRI-STATE TELEPHONE & TELEGRAPH CO.
MINNEAPOLIS & ST. PAUL

St. Paul, Minnesota,
Merriam Park,
November 10, 1913.

"Telephone Engineer",
Monadnock Block,
Chicago, Illinois.

Dear Sir,-

The "Telephone Engineer" is certainly to be congratulated on its most excellent editorial in the November issue, relative to the organization of the Independent Telephone Association of America. I am sure that it will be thoroughly appreciated by every man actively connected with the new Association.

In conducting a campaign for membership from this territory we would very much like your permission to make a re-print of this editorial and of the article by Mr. Vivian, which also appeared in your November issue. Your publication will, of course, be given credit for both articles.

Upon receipt of this letter will you kindly advise if we have your permission to make these re-prints? In this connection may we not also use your cuts of Mr. Fisher and Mr. Vivian?

Yours very truly,

GWR/MS. Treasurer.

It will be remembered that the Central Union report commented on the apparently high rates and limited service given by the company at that time, as well as the arbitrary treatment of patrons, as causes for the success of competing exchanges. The company, taking the stand that it owned all patents, endeavored to drive the independents out of business. In the manufacturing field, according to the report, competition between the independent interests put all upon their mettle, and very soon there were firms that manufactured a broad and variegated line of apparatus, were as well equipped, did as good work, attained similar results and were supplied with the best of talent.

The independents, therefore, succeed, as the report stated, because of their reversal of the Central Union policy. They appealed to the sympathy and sentiment of the people with local management and capital, courteous treatment and the extension of service to rural communities under a liberal policy, and consequently had the loyal co-operation and support of the public. Therefore, the local companies in Indiana, after passing through years of constant warfare with a competitor that had at its command unlimited capital, a press bureau, trained legal and electrical talent, etc., while they had none of these, no experience, no long distance service, exceedingly limited manufacturing facilities, suspicious capital, and threatened and actual lawsuits, attained real success.

A little more than six years have elapsed since Mr. Whitney submitted the report above referred to, which was such a clear, frank statement of existing conditions. Notice that instead of following the arbitrary policy which the Bell company had used for so many years, shortly after Mr. Whitney's report was made the company's relation with independent telephone companies changed very materially. The acquaintance of independent telephone men was cultivated, and at what seemed to be the psychological moment, propositions were made to buy, offering fancy prices. Such property was usually located as the connecting link between several independent companies, and thus in buying a serious handicap was placed on the adjacent independent companies. Propositions to place long distance lines on the independent boards were offered. In some cases where independent companies would refuse to place these lines on their boards, the company would try to compel them by discounting long distance messages coming into that territory, sometimes as much as 50 per cent, and thus furnishing service at less cost than the independent company could possibly do, and much less than actual cost.

Since Mr. Whitney's report was written, many of the state and district independent associations which were formerly so active and aggressive in the independent telephone development have either died, or apparently are fast asleep. The seed of suspicion, doubt and distrust has been sown between many of the independent operating companies. Several of the larger independent interests of the country whose representatives for so many years were so much in evidence at state and national gatherings, and who spoke at length and many times on the stability of the independent telephone business, and who waxed patriotic in the great service they were performing for the people, have made their "deals" by either selling outright to the Bell directly or indirectly, or by territorial division, resulting not only in making it almost impossible for their neighboring companies to market their securities locally, but doing also a general injury to the whole independent telephone movement. I submit that if the independent telephone interests of this country had followed the advice which Mr. Latzke gave in his editorial referred to, many of these things which have occurred and many of the conditions of which we are now advised would not have happened or would not now be necessary. It is a strange thing, in the face of the avowed declaration and intention of the Bell company, that independent telephone companies

should do anything else than to form a strong alliance which would adequately protect them all; for the Bell people claim in words that cannot be misunderstood that the telephone business is a natural monopoly, and that they should be that monopoly, and that their intention is to again secure control of the telephone business. It is plain that while some of the policies of the Bell have changed, still when they approach any independent telephone operator and make any kind of a proposition, the real purpose is to get control and do away with competition. And if the independent telephone companies of America now want protection against further loss, if they really believe in the future of the independent telephone industry, they will make the Independent Telephone Association of America such a power, offensive and defensive, that it will be absolutely impossible to carry out any policy of monopoly.

At this time we are approaching a thorough and far-reaching telephone investigation under the auspices of the Interstate Commerce Commission. The result of this investigation will have an effect, beneficial or otherwise, on every independent telephone company in the land, regardless of whether they are large or small, and if each independent telephone operator will but take time to think of the changes which have occurred in the last six or seven years, for their own protection they would lose no time in affiliating themselves with the Independent Telephone Association of America.

European Telephone Development

By Fred W. Scholz

IMPERIAL TELEGRAPH AND TELEPHONE TESTING STATION.

REALIZING the necessity of a thorough training for telegraph and telephone engineers, the Prussian department of telegraph founded the telegraph school in 1859, which in 1884 was broadened and called the Post and Telegraph school, in which engineering students were taught the principles of telegraph, telephone and similar branches of engineering. About this time the school received an addition in the cable testing department in which the various kinds of cables were tested and the faults in the existing cables were carefully studied. Soon the demands on the school grew to such a size as to make the older quarters and equipment insufficient. The rapid progress of telephone work, and also the advance of wireless telegraphy and telephony, made new buildings and better laboratories an absolute necessity. The field over which the work of this school is scattered embraces telegraphy, telephony, wireless telegraphy and telephony, overhead wires, cables for ordinary telephone service, submarine cables, the influence of high tension lines on the neighboring low tension lines, chemical investigations and questions in electric lighting. The testing laboratory works not only on theoretical but also on practical lines, testing new products put out by various companies, and investigating lines in operation.

The building in which the testing laboratories are housed at the present time has five stories and is really an old type mansion, rebuilt for modern purposes. All the laboratories and lecture rooms are heated by hot water heating system, the radiators being along the sides of the walls and not near the windows, as the window spaces are required for work tables. There is no special ventilating plant, except in the laboratories where vapors are liable to arise, where the usual hoods have been provided. Lighting is electric throughout. The lighting wires coming from the Berlin Electric Works are run separate from all other wires, in order to insure greater safety in case of accidents to other parts of the plant. All lighting, except that in the drafting rooms, is direct. Most of the testing laboratories have gas connections and water supply system. Three trunk lines run from the building to the Berlin telephone exchange, and all the laboratories are provided with telephones. There is also a cable line to the main building of the telegraph department for testing purposes.

For tests with low tension current all laboratories are interconnected by a network of low tension wires. On every floor there is one large switchboard, and smaller boards in the various laboratories. The high tension lines used for running the motors in the different engineering testing laboratories draw their current direct from the feed cables of the Berlin Electric Works and send it to the transformers. There are various sizes of transformers. A rotary transformer for 30 k. w. gives alternating current of 50 periods per second. It consists of a four pole motor with reversing poles, which drives a four pole dynamo with collector and clip rings, so that a. c. or d. c. of 78, 55 and 39 volts, or a. c. of 55 volts can be taken. A single armature transformer of 5 k. w. gives a. c. of 80 periods at 160, 140, 112, 78 and 39 volts. It can also be used as a motor and be belted to a d. c. generator for 15 volts, 120 amperes or 120 volts, 15 amperes. For wireless telegraph work a small a. c. generator for 50 periods and two a. c. generators for 500 periods and 2.5 k. w. are employed. Within a short time this equipment will be increased by a d. c. generator of 6,000 volts and 10 k. w. capacity. For high frequency work there is a transformer aggregate of 3 k. w. capacity with a d. c. generator for 220 volts and two coupled a. c. generators. One of these generators furnishes current up to 1,800 periods per second at a current strength up to 15 amperes and a voltage of 600 volts. The second generator gives up to 7,000 periods, 10 amperes, 350 volts. Of current generators not connected to the electric current system the school has an oil engine driven dynamo for 2 k. w., a. c., and 500 periods used for field tests with wireless telegraphy. As a rule the tests are provided with the needed current from storage batteries. The large battery is divided into ten groups. The different groups give 54 amperes with 18 amperes discharge current, and 90 and 100 ampere hours with 12 and 19 ampere hours discharge current. Groups one to five are placed in series and give 80 volts. Group six has a total tension of 96 volts which can be subdivided into $32 + 32 + 16 + 16$ volts. For very small tensions, and general measurement tests two batteries giving 60 ampere hours and 26 volts each are used. The high tension battery used for tensions up to 500 volts had to be placed with great care. The battery consists of twelve single elements, which can be used alone or in groups. Every group consists of two boxes with ten elements cast to the boxes. Every box rests separately on porcelain insulators, and every set rests on a box which is also insulated from the stand by porcelain feet. The stand itself

is well insulated from earth, giving a triple insulation between the earth and each cell. All wooden parts are made of hard pitch pine, are triple coated with acid-proof paint, and the wires coming from the binding posts of the batteries are passed through oil vessels to prevent the creeping of the acid. The switchboard is of perfect marble, coated with an acid-proof solution, and rests on high tension porcelain insulators. The entire high tension battery and switchboard is encased in a dust-proof closet. The high tension transformers are placed in a separate transformer house on the outside of the building and transform the current from 78 volts in one step to 200,000 volts. In order to preserve the operator from danger, the entire section under the high tension influence is behind a cage, whose door when opening, interrupts the primary current. Moreover red lamps on the transformer starter and the switchboard show when the transformer is in operation. There is also a transformer of 10,000 volts in the engine room which is to test the insulation of wires. Besides this there is a low tension transformer, air insulated, which has a capacity of 3 k. w. and increases the voltage of the single armature transformer from 110 to 220 volts. This finishes the general equipment of the testing station, and we can now proceed to details in the various laboratories.

Among the equipment needed for testing of cables and wires there are three large instruments in form of switchboards representing telegraph cables insulated with guttapercha, in lengths up to 1500 km. In a smaller board is a 3 mm. bronze line of 430 km. length. To imitate two wire telephone cables there are five box-shaped instruments, each having a cable length of 10 km. and 0.7 microfarad and 700 ohms. Two sets of artificial telegraph cables of the Muirhead type, each with 25 microfarad and 1000 ohms are used for testing telegraphs. For telephone work there is a switchboard having all types of connections and lines, fed by 50 elements, each of 5.72 ohms, 0.195 henry and 5.55 microfarad. There is in addition a telephone cable with 50 pairs of wires, of 2214 meter length, which is connected to the Berlin telephone exchange. In order to test telephone conversations, this experimental line is exchanged during the tests with the standard line used in actual working. For this purpose the testing station has artificial lines of every description, which can be exchanged during the testing for the actual lines used in operation. For accurate registration of changes in telegraph and telephone lines there are six Siemens oscillographs, which are invaluable for registering the processes going on in the line during the tests or during operation. For the investigation of a. c. within the frequency of audible tones there is a Franke generator which furnishes two sine-shaped e. m. f. of the same number of periods, whose amplitude relation and difference in phases can be changed at will. This machine is used not only for measuring in the testing laboratory but for testing of Pupinized telephone lines, before they are accepted by the government as perfect. Investigations of the dielectric properties of insulating materials are made with the aid of a specially constructed bridge. The condenser or the cable length is here compared with a precision air condenser of known capacity. In order to measure the temperature in the insulating materials, a very important factor, a large thermostat is used, which gives temperatures from —10 to +80°C.

For testing of wires, iron construction elements and other similar materials several material testing machines have been set up in the basement. The largest of these tests for a tensile strength of 25 tons, and can be used for compression tests by a very simple change in arrangement. The testing machine is driven by a gear connected electric motor. This same machine can be used to test porcelain insulators by placing a steel wire around the neck of the insulator and testing the latter for shearing strength. There are two other tensile testing machines of 1000 and 3000 kg. tensile strength which are used to test the tensile strength of wires and the strength of wooden construction materials. In addition the laboratory has a torsional and bending testing machine.

For testing the battery cells used in telephone practice, especially the dry cells, an equipment has been provided in which each cell is closed over a 10 ohm resistance once in every 15 minutes for a period of 3 minutes. For testing insulators under weather and especially rain influences a so-called rain closet is used. The insulators are here placed on artificial supports and are then exposed to rain, coming through a shower or spray. The closet is of iron and provided with glass doors.

To test wooden materials for their resistance to decay a so-called decay-cellar has been built. This stands out in the yard and is sunk as low as was possible in relation to the ground waters. This cellar is 4.5 meters long, 3 m. wide and 2.5 m. deep. To provide the proper temperature conducive to decay of timber, the cellar is dug as low as possible, as said, and is equipped with heating coils and water sprays. The roof is covered with earth and a layer of moss.

The telegraph and telephone testing station is always at the service of German manufacturers and tests can be made of any sort of material at very low costs. The government in this manner has solved a problem which ought to be of great importance to us also. It trains the engineer in his own line of work; it employs the best scientists and practical men in both telegraph and telephone work, and offers the manufacturer an unbiased testing laboratory, whose results are accurate and beyond question. These laboratories are always studying ways and means to improve existing apparatus and are therefore a benefit not only to their own engineers but to the engineers all over the known world who are interested in the progress of their chosen profession. The results obtained in these laboratories are not hidden through fear of publicity or exploited for commercial reasons but are published broadcast and given over to the engineering profession to benefit all those willing to adopt the results obtained by careful analytical work and painstaking methods.—*Elektrotech. Zeit.*

GROUNDING OF ELECTRIC LINES.

In treating the matter of grounding parts of electrical circuits, we must remember in the first place that proper grounding depends on: *1.* The size of the electrode. *2.* The properties of the electrode. *3.* The position of the electrode in the ground. *4.* The properties of the ground. If we consider the earth independently of the electrodes we find varying conditions, depending on the nature of the ground and the moisture in it. Tests made in 1909 gave for conductivity at temperature of 15 to 20 degrees C. per cubic meter:

Sand	= 0.775.10-4	with 9 vol. per cent water
Garden Earth..	= 7.8.10-4	with 50 vol. per cent water
	= 2.1.10-4	with 20 vol. per cent water
Black Dirt....	= 10.4.10-4	with 60 vol. per cent water
	= 1.4.10-4	with 20 vol. per cent water
Loamy Ground.	= 13.10-4	with 40 vol. per cent water
	= 3.10-4	with 20 vol. per cent water

Earth with 10 volume per cent water can be called

dry earth, and wet earth beginning at 20 volume per cent water. When the temperature increased above 20 degrees C. the resistance decreased down to 60 per cent. If the earth cooled down to the freezing point and below, there was a considerable increase in resistance, which might be attributed to the withdrawal of moisture through formation of ice. Open grass plots or grass plots bound by iron loops showed an increase in resistance of as high as 1000 per cent at frost time. With surface ground conductors which are only laid as deep as 30 cm. the increase in resistance during frost runs as high as 100 per cent. That not only the nature of the ground but also the pressure play a considerable role was seen by tests in which the pressure was increased from 20 to 200 grams per sq. cm. The increase resulted in increased conductivity, which with garden earth of 10 parts by weight water was 35 per cent and with sand of 5 parts weight of water was 16 per cent. It is therefore very important to fill in the ground and tamp it down tight, as otherwise there will be an increase in resistance from electrode to earth as also in increase in the earth resistance.

We come now to the usual methods of grounding, the first one being pipe lines. Water and gas mains run many kilometers in length and have therefore a resistance to earth which is practically equal to zero. With the recent Mannesmann pipes, however, which are coated with tar paper, we have less favorable conditions. These are not suitable for connection between higher tension current and earth. The same holds true of gas pipes that are not well protected at the unions with lead solder.

The second method is the use of ground plates. Their use is not advisable on account of the greater expense of excavating and filling in. With high ground waters their cost is of course reduced, but their use is very complicated when compared to the resistances obtained. Much trouble is often experienced in the sinking of the ground water level, when the ground plates show very high resistances. Often the plates do not reach ground water at all and are separated from the latter by a layer of moist ground which soon dries out. The custom of helping out low ground waters by imbedding the plate in coke is not advisable, due to the possible destruction of the earth conductors. The resistances obtained are in many cases not as low as anticipated. Several ground plates used for lightning arresters proved to have resistances between 5 and 25 ohms, while others had resistances as high as 100 ohms. Since in many districts the sinking of wells reduces the level of the ground water these ground plates should be laid at least as deep down as 2 meters. But since the ground water in most districts is as low as 5 meters, the costs would be excessively high, for which reason it is better to use other methods.

The next electrode is in the form of iron pipes and wires lowered vertically into the ground. They are usually lowered down to a depth of about one meter below the ground water level. But even with pipes as low as 18 feet below water level, resistances were found ranging btween 20 and 50, and 90 and 120 ohms, while others of the same dimensions gave only 10 ohms. An improvement on the pipes are thin galvanized iron rods which can be driven deep into the ground with little trouble and will give 10 to 20 ohms in loam ground at a depth of 10 feet, although in sandy soil the value will rise to 50 to 150 ohms. If the ground water level is low, at a depth of even 17 feet, the resistance can increase by 100 per cent, if there are long periods of dry weather.

Since the spreading of electric discharges, especially during thunder storms, takes place in the surface layers of ground, various conductors are laid in these layers to protect people. These wires, bands or wire ropes are usually placed about 30 to 50 cm. beneath the surface. The resistance of these wires, with sufficient length, becomes so small that they offer excellent protection. The magnitude of this resistance depends to a great degree on the nature of the ground. With more than 100 such conductors of galvanized band iron from 100 to 225 feet in length, placed about 30 or 40 cm. beneath the surface, the resistances under normal conditions of ground were as low as 3 ohms. With 300 feet length the resistance may be about 2.9 ohms and with 5-6 of a mile about 0.2 ohms. If the lines are placed only 30 cm. (12 inches) underneath the surface, there are no changes in the resistance that influence the value of the grounding to any appreciable extent.

In order to reduce high voltages in the vicinity of the place of grounding, Wilkens proposed to place rings or spirals around the pole and to connect these with the pole. Good results were obtained by using two concentric rings of band iron, each 25 by 2 mm and from 5 to 15 feet in diameter, which were just driven into the ground. Nevertheless, with all these precautions, there is a considerable tension around the pole. Attempts have therefore been made to increase the conductivity of the surrounding ground by saturating it up to a distance of 5 feet all around the pole with a salt solution. Although the ground within the saturated circle shows less resistance, the tension increases at once as soon as the limit of the circle is reached. There is no indication of the extent of time to which this salt solution remains active. There is no question that the total resistance of the ground connections is changed very little by the saturation process. A similar result could be obtained by substituting coke for earth in the vicinity of the ground connections. In general, it may be said that such methods do not offer satisfactory protection for the general run of poles.

As regards life and costs of the different ground connections very little can be said, as the factors entering into the problem are so varying. There are grounds where iron holds excellently and where copper is easily destroyed. There are other earths where the opposite is the case. For shorter lines where the cost of wire plays no role, the 8 mm. copper wire and copper band is advisable. With long lines well galvanized band iron 20 by 3 mm. is advisable. Under normal conditions iron conductors can be expected to be in good condition even after a period of 20 years. Even if parts of the ground plates should rust, there is no danger, as the interior parts are still conductors. The costs figured out for galvanized band iron give about 5 cents per foot for material and 10 cents for excavating and filling in. Ground plates are, of course, much more expensive in laying, especially if the ground waters are low. How good copper covered steel wire and iron wires with copper coverings may be used to advantage is an open question and is being tested out in various laboratories.—*Elektrotech. Zeit.*

EFFICIENCY OF TELEPHONE OPERATORS.

Telegraphen und Fernsprechtechnik brings an interesting article on the efficiency of telephone operators, based on experiments and observations made in the Hamburg telephone exchanges. The experiments tend to determine the time when the operators make the greatest number of errors and when their efficiency sinks to a minimum. The greatest number of errors seems to be made during the period from 7 to 8 o'clock in the morning. The reason given is that the operators have to rise

very early to reach their exchanges for the 7 o'clock service and are not up to their par until about 9 o'clock or later. The operators beginning work at 9 or 9:30 seem to be the best physically and mentally from this standpoint. The afternoon hours show similar results. The operators who come to work at 3:30 and 4 o'clock, who have the entire morning off, are also numerous in their errors. The reason given is that the operators do not use the morning hours for rest and recreation, but do their shopping or their housework and are therefore somewhat tired. The best results are obtained with the operators who are employed both in the later morning hours and the afternoon hours. The fatigue curve increases from about 9:30 to 12 o'clock and then decreases after the noon rest of two hours.

The statistics are facts that cannot be doubted. The conclusions, however, are open to discussion, for the reasons for the dropping of efficiency and the numerous errors may not have been followed out to their last step. For example, the reason given for the fatigue curve of the afternoon operators in that they are tired out from the morning's work may be good in some cases, but is not universal. There is probably another cause which enters in. This cause is doubtless the usual drop in efficiency which most people experience after the noon hour, and especially after a heavy meal. Consider that the German custom is to have a heavy meal at noon and a light supper in the evening. The fact that a good dinner, or even a good lunch makes the person in question somewhat lazy and drowsy is well known, and is a matter of experience to every observer. It is true not only in the telephone exchange, but also in the office and the class room. Most educators will agree in preferring morning or later afternoon classes to classes immediately after the noon recess. The fatigue curve rises after dinner and lasts at its height for about one hour, and then drops, accompanied by an increased efficiency and a wakening up of all the faculties, which will keep up until late in the afternoon.

The operators coming on duty at 1 or 2 o'clock have to leave their home probably one-half or one hour before and take their noon meal at an unusually early hour. This results as a rule in slight disturbances in digestion, especially if the operators change off from week to week in their hours, as is the case in many exchanges. The operator must choose between two evils. Either she eats her meal very early and takes her chances on digestive troubles, or else she eats later, hurries down to the exchange and goes without her dinner rest. The operators with morning and afternoon service, on the other hand, get that rest after dinner, having two hours recess, and are therefore fresher when they come back on duty. Add to all this, that the operator is seated and not moving around, perhaps in an atmosphere which is warm and even poorly ventilated, and there is no wonder at her drop in efficiency. Another factor which we must add is the fact that many of the operators are forced to do their own housework and mending, even if they live at home. That means that they are using up some of their surplus day's energy in the morning in doing housework or mending and have that much less to spare for the afternoon. On the other hand, they are not so rushed in the morning, fearing to sleep late and come late to the exchange and their frame of mind is calmer and less nervous than is probably the case with the operator coming on duty early or even later in the morning.

We have said before that the efficiency curve for the operators having both morning and afternoon hours is higher than that for either of the other operators. If, however, we were to argue, from that result, that the double service is better for the operator and for the exchange, we would draw the wrong conclusion. The double hour plan is more severe and nerve-racking than either of the two other systems, and the operators are worn out sooner and are under a greater strain, in spite of the fact that during the six days of work, two are usually spent in double time, followed by two with afternoon service and two with morning service. The operators themselves say that the two easier days do not balance the two hard double days. The remedy for this state is, of course, not hard to find. Instead of having double service for two days a week, with the efficiency curve at its highest position, but with greater wear and tear on the nerves of the operators, use the morning and afternoon service for different operators entirely. The efficiency curve will not be as high in the concrete instances, but the life of the operator's usefulness will be much greater and she will be more content and will give better service in the long run.

NEW PROCESSES IN TELEPHOTOGRAPHY.

Recent years have seen various processes patented which were to permit the wire transmission of pictures and images. The best known of these telephotographic machines is that of Korn. From time to time there are new systems described in the papers which claim to be practical. Many of them are, however, useless for practical work. A system invented by a Budapest photographer claims to transmit pictures by telegraphy, telephony, or even by wireless. The practical value of this system lies in the fact that it requires no trained operators or special equipment to transmit the pictures. The method really uses telegraphy only as a means to an end to transmit a long message. The process is as follows: The photograph of a criminal is required in Berlin, but the original is in Hamburg. The picture is treated in a certain way and a text is telegraphed to Berlin, consisting of the letters in the alphabet. The telegraph operator transmits the text without knowing that the same is to be used for the building up of a picture. The Berlin police department can translate this senseless text into the original picture copy by the use of a special typewriter. No extra apparatus is needed. The only drawback might be the time consumed in preparing the text, which takes 2 hours, and the transmittal of the thousands of letters, which takes another hour. The technical principle operating in this system is very simple, although it differs from all present systems. Instead of subdividing the picture into a large number of elements, each of which is a darker or lighter shade, and then using the sensitive selenium cell, the new process divides the picture into white and black surfaces. All intermediate steps and shadings disappear. The shadings and half tones in the original will be shown in the closer and denser number of dark places. The inventor found that with his own particular division apparatus, he could make pictures in which the black and between them the white lines showed in exactly parallel and vertical groups. With considerable enlarging of the copy he saw that the black surfaces, which were grouped like fields on a chessboard, had certain geometrical forms, which were repeated in numerous ways in the picture. Accurate examination showed 22 geometrical surfaces. These were named with the letters of the alphabet. It is a question in transmitting the picture to transmit the various figures in their exact sequence. It would, of course, take much time to draw the figures from the letters transmitted, and the inventor

uses a machine provided with the type figures mentioned before. The resulting text, senseless in itself, is transmitted into white and black surfaces which group themselves on the paper in horizontal and vertical groups exactly as was the case on the prepared picture. All that need be observed is the finish of the series, as otherwise the features of the picture will not fit into each other. If then the original picture divided into geometrical figures by the special divider be translated into letters, these can be telephoned or telegraphed to the receiving station and there transcribed into the picture with the special typewriter.—*Zeit. f. Schwachstrom.*

Telephone Famine in Vienna

Because of the recent war in the Balkans, it is impossible for thousands of would-be telephone subscribers in Vienna to get service. In that city there is little chance to get a telephone installed under a year, and the reason is that the money ordinarily expended by the government on telephones in Vienna has been diverted for military purposes. The public is indignant, there is constant complaint of interruptions to the service; the breaking of connections during conversations, outside noises on the line, etc., but all to no purpose. There is no money to spend on the system; nearly all the workmen have been dismissed, and the opening of three new exchanges promised for this fall has been indefinitely postponed, says a report from Vienna.

For several years past Vienna has suffered from what might be called a veritable telephone famine. The demand for telephones quickly exhausted the capacity of the government system. No private person could hope to get a telephone under a year or so, and when the time came to put in the apparatus nothing was ever done before an official had called to inquire if the telephone was still desired. It frequently happened that the intending subscriber had grown tired of waiting—sometimes he was dead—before the telephone was in sight.

An interesting story has just come to light which explains what was done with a part of the moneys diverted from the original telephone appropriation, and also shows the bureaucratic methods prevailing in Austria.

When the mobolization was in full swing last winter Galicia was flooded with troops, the war office linked up gendarmerie posts and military encampments with telephones in great haste. This was in a thinly populated country where the telephone was scarcely known. After the war scare was over there was no further use for these telephones for military purposes, but the poles, wires and call stations were left standing. Now the small towns and villages through which the telephone passes have asked to be allowed to use it, but the government refuses permission unless these communities pay the cost of construction. As they are entirely unable to do so all this costly installation, made at the expense of the taxpayers, including those in Galicia, stands idle and is left to rust and decay.

North Dakota Commission Limits Power

North Dakota Railroad and Warehouse Commission has no power to order opposing and competing companies to maintain physical connection between their lines, under the laws of the state as now constituted, according to a decision just handed down by that body. This matter has been before the commission for several months and has been bitterly fought on both sides, the North Dakota association of telephone companies having had charge of the opposition to such an order being given by the commission.

The history of the case dates back to the early part of the year, when the Berthold Farmers' Telephone Company petitioned the commission to compel the Northern Telephone Company, which also has an exchange in the town of Berthold, to make physical connection with the Farmers' line so that the patrons of it could obtain the benefit of the Northern's long distance service. The petition was later changed so that a subscriber of the Farmers' line made the petition that the two companies be compelled to make physical connection.

The matter has come up at several meetings of the commission, the last time being at the meeting held here in Fargo during the past summer. At that time it was ordered that both sides to the controversy submit briefs to the commission, and this has been done. After a thorough consideration of the matter, after studying the briefs presented, the commission has come to the conclusion that under the present laws of the state it has no power to give such an order. The petition was duly dismissed.

As a result of the decision, supporters of the movement to compel such connections announce that they will seek legislation on the question at the next state assembly.

One Link in Transcontinental Line

As a necessary step to the establishment of a transcontinental telephone line between San Francisco and New York, the Mountain States Telephone and Telegraph Company has petitioned the city commission of Salt Lake for a franchise to string a new set of wires through Parley's canyon.

The communication sets out that a number of Bell telephone companies have undertaken in unison to build the transcontinental line and the local company is to build through Utah and Colorado. The city having jurisdiction in Parley's canyon, a franchise is necessary.

The company proposes to build the new line high on the hillside so as to escape the proposed reservoir, which the city is contemplating building. Special wiring and "loading" is essential for the transcontinental service, it is pointed out, and consequently the company desires permission to build its line permanently through the canyon.

Telephone Service in Kyushu

Telephone service is supplied by the Imperial Department of Communications to the following towns in Kyushu, Japan:

Towns	Subscribers	Applications
Fukuoka	1,582	457
Kagoshima	1,333	141
Kokura	413	128
Kumanoto	1,260	221
Kurume	713	49
Miyazaki	245	59
Moji	774	213
Nagasaki	1,454	417
Naha	298	9
Oita	305	29
Saga	533	58
Sasebo	489	116
Wakamatsu	375	35
Total	9,774	1,892

During the first seven months of the current year there were, as shown above, 1,892 applications for telephones filed in the Communications Department, but only about 30 per cent of them were granted. In addition to the cities mentioned, Karatsu has 327 subscribers, Imari 102, Omura 81, Omuta 179, and telephonic connection is provided for Miyakonojo and Yawata, but the number of users in the two latter places is not stated in available data.

The Joint Use of Wires

By H. S. Warren*

IT IS a fortunate circumstance that telephone currents and the commonly employed kind of telegraph currents are of such character and relation that under favorable conditions both can be transmitted simultaneously over a circuit without either one interfering with the other. For several years it has been commercially possible for certain classes of telephone circuits to be utilized also for telegraphic communication without interfering with their regular use for telephone purposes. The telegraph service thus afforded is of very high grade; in

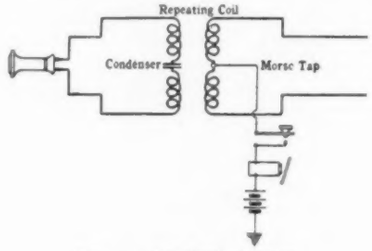


Fig. 1. Standard Simplex.

fact, simultaneous telephone and telegraph operation is of itself a guarantee that the lines will be kept in first-class condition.

TELEPHONE CURRENTS

The wave forms of telephonic voice currents are exceedingly diversified and complex. Every sound in a telephone transmitter produces its own peculiar train of electric waves which distinguishes it from every other sound. Even the same word or syllable spoken by different persons produces telephone waves of different characteristics whereby the voices of different individuals may be recognized. An efficient telephone circuit must transmit telephone waves at approximately the same velocity and with approximately the same attenuation, otherwise the sounds will be distorted and, as heard at the receiving end of the line, will not correspond accurately to the waves sent out by the transmitter. The normal range of the human voice for pure tones is approximately from 80 to 800 periods per second. The fundamental tones employed in talking fall within much narrower limits. In order, however, to take care of overtones, a telephone circuit should

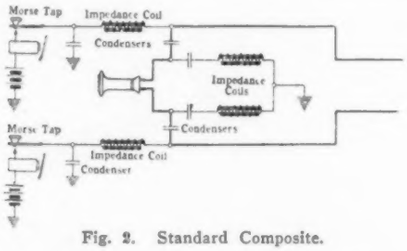


Fig. 2. Standard Composite.

transmit waves up to at least 2,000 periods per second, otherwise quality of transmission will be impaired. It is also desirable to be able to transmit the lower periodicities within the compass of the voice.

TELEGRAPH CURRENTS

While several alternating-current telegraph systems have been devised, direct current is ordinarily used in telegraphy in this country. The current is caused to flow for a longer or shorter time to register a dash or dot respectively, the intervals between successive dashes and dots representing periods when the flow of current is interrupted or reversed. The actual length of time during which the current flows in one direction may vary from approximately one-thirtieth of a second to one second or more, depending on the speed of sending. This refers only to manual sending, as high speed machine sending is not ordinarily used in connection with the telephone circuits.

SIGNALING CIRCUITS

Besides the currents above described it is usually also necessary, on a joint telephone and telegraph circuit, to employ a current for telephone signaling purposes, but as this signaling current is not on the wires at times when the circuit is in use for talking, it is customary to operate

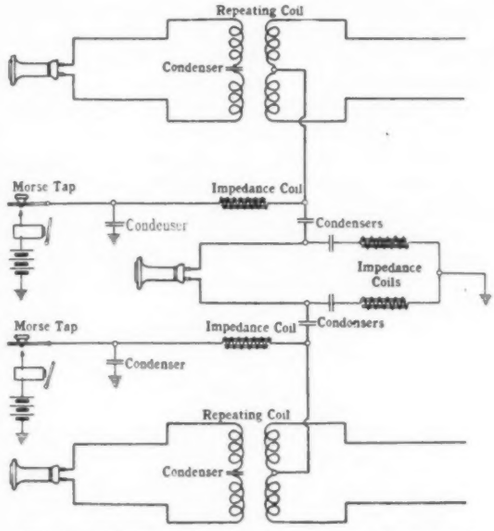


Fig. 3. Telephone Circuits with Phantom Superposed.

the signals by alternating current of a periodicity within the telephonic range.

PREVENTION OF INTERFERENCE

The prevention of interference between the telephone and telegraph currents is a problem not of the line itself, but of the arrangement of transmitting and receiving devices at the terminals. The currents do not interfere with each other in their propagation over the line. The conditions essential to non-interference are:

1. That the telegraph transmitting devices may impress Morse currents on the line without disturbing the telephone transmitting or receiving stations, and conversely.

2. That the telephone transmitting devices may impress telephone currents on the line without having these shunted into the telegraph instruments to a harmful extent. The last named condition is set up, not because of fear that the telephone currents would interfere with the operation of the telegraph instruments, but in order

*The Electric Journal.

to minimize impairment of telephonic transmission efficiency.

COMBINATIONS

The two most common forms of combining telephone

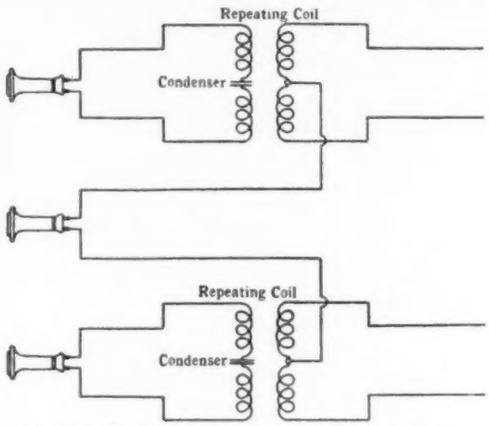


Fig. 5. Phantom Telephone on Composite Circuits.

and telegraph operation are the *simplex* and the *composite*. The simplex affords one Morse circuit, the composite two Morse circuits per telephone circuit; i. e., per pair of wires.

Simplex—In the simplex system, shown diagrammatically in Fig. 1, the telephone circuit is kept balanced and symmetrical so that the mid-point of the line winding of the repeating coil, where the Morse tap is connected, is always a point of zero potential in respect to telephone currents. Thus there is no tendency for the telephone currents to flow into the Morse tap. The telegraph currents in flowing from the Morse tap to the line, or *vice versa*, divide equally between the two symmetrical halves of the repeating coil winding and the two opposing voltages induced in the telephone circuit exactly neutralize each other. The effect on telephone transmission of adding the simplex repeating coils is too small to be detected by the ear, the energy losses in these coils having been minimized by refinements in design and construction. The simplex furnishes a highly efficient telegraph circuit, and is often employed where there are enough line wires available to permit the use of two wires for each telegraph circuit. A simplex circuit may be operated by any of the standard telegraph methods—single line, duplex or quarduplex. Duplex and quadruplex telegraph circuits are circuits arranged for sending simultaneously two and four telegraph messages, respectively, over one circuit.

Composite—The purpose of the composite is to prevent telegraph currents from interfering with the telephone currents, also to prevent the telephone currents from leaving their own circuit and getting into the telegraph apparatus. The method which has been found by experience to accomplish these purposes most satisfactorily is that shown diagrammatically in Fig. 2. Interference is avoided by a somewhat elaborate scheme of balancing with condensers and impedance coils. The exact proportions giving best results have been determined by experience rather than by theory. This arrangement is a compromise between that which would most effectually keep the Morse thump out of the telephone circuit and that which would least impair the telephonic transmission efficiency. The standard composite accomplishes both of these objects very well the effect on the talking efficiency being about the same as with the simplex, and the Morse thump is so thoroughly eliminated as to be inaudible in the telephone under ordinary working conditions. Short lengths of composited line may be worked quadruplex, but in general composited circuits are restricted commercially to single line or duplex operation.

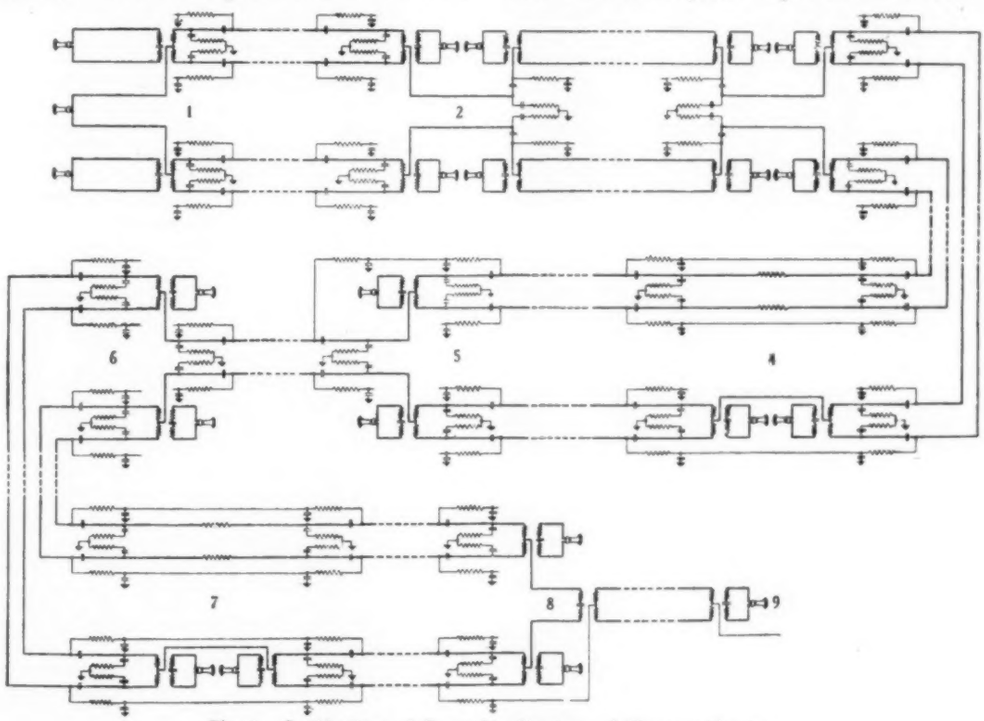


Fig. 6. Combinations of Composite, Simplex and Phantom Circuits.

Phantom Circuits—The best examples of economical

use of wires are those involving phantom telephone circuits. By means of suitable repeating coils two telephone circuits (four wires) can be made to afford three metallic telephone circuits. The manner of accomplishing this result is shown schematically in Fig. 3. Each side of the phantom circuit is formed in the same way as a simplex telegraph circuit. However, it must not be inferred that the phantom telephone circuit is as easily applied as the simplex. It was many years after the simplex was invented and in use before repeating coils were developed which were sufficiently well balanced and efficient to make "phantoming" possible.

Morse on Phantoms—Given a pair of phantomed telephone circuits, there are two methods of superposed Morse in use. One of these methods, shown in Fig. 4, consists in applying the standard composite to the phantom circuit. The two Morse circuits thereby obtained may be worked duplex, in which case four telegraph mes-

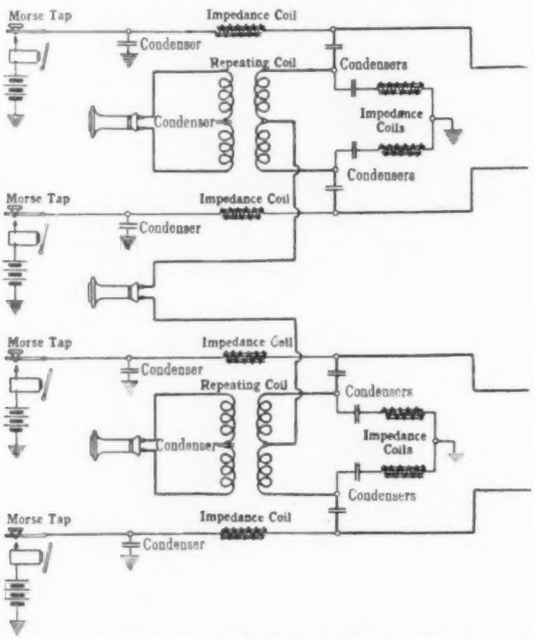


Fig. 4. Phantom Telephone on Simplexed Circuits with Composite on Phantom.

sages may be transmitted simultaneously with three telephonic messages. The second method, which is somewhat superior to the foregoing, is shown in Fig. 5. In this case each wire is composited so that from the four wires obtained three telephone circuits and four telegraph circuits. As each telegraph circuit may be duplexed, a total of 11 independent simultaneous messages is possible.

Circuit Combinations—These three devices, the simplex, the composite and the phantom, offer opportunity for a wide variety of circuit combinations. Circuits to cover great distances may be built up by connecting together lines working independently between intermediate points. An example of this sort is shown in Fig. 6, which will give an idea of the various possible combinations.

The above discussion will indicate some of the possibilities of increased efficiency and economy in the public service afforded by cooperation between these two systems of communication.

Central Union Enjoined

An injunction against the Central Union Telephone Company to restrain the payment of accrued interest upon an indebtedness of $30,000,000 to the American Telephone and Telegraph Company was granted by Judge Dever of the Superior Court in Chicago, Ill., on the petition of William A. Read, Charles J. Spencer, Charles G. Foster, Archibald A. Beebe, Ernest M. Kimball and Frederick W. Schwamb, minority stockholders of the Central Union Company.

The injunction is an extension of one granted by Judge Dever last February in the same case. It is asserted that a deficit exists in the funds of the Central Union Company and that money has been borrowed from the American Company to meet this. The injunction is to prevent the local company from securing further loans from the American company.

Payment of the principal, or any part of it, is forbidden in the injunction. The Central Union Company is also forbidden to add to its present plant by the purchase of competing companies, although the right is given to add equipment necessary in the general course of business.

The complainants stated it to be their opinion that an attempt is being made on the part of the American Company to secure control of the Central Union Company and thus "freeze out" the minority stockholders. The assertion was made that the present board of directors of the Central Union Company are "dummies" for the American Company and are secretly acting for the interests of the American Company.

A receiver was first asked, but this was refused by the court, a provision of the injunction being, however, to restrain any and all interested parties from seeking a receiver for the Central Union Company.

Southern Railway's Telephone Block

Installation of the telephone block signal system on the 147 miles of the Southern Railway in Georgia, between Macon and Jesup, has been announced by Vice-President and General Manager E. H. Coapman. A telephone line with stations at every passing track has been constructed and fifty additional telephone-telegraph operators have been employed. Three additional train dispatchers have also been employed in the Atlanta division headquarters to give their entire time to the Macon-Jesup line.

Safety and facility in handling trains will both be increased by the introduction of this new system. The telephone has been tried on other important lines of the Southern system, and has been found entirely successful. With the installation of this modern system of signaling between Macon and Jesup, the entire line of the Southern Railway and the Queen and Crescent Route between Cincinnati and Jacksonville is protected in the most efficient manner.

Dayton Franchise Refused

In a communication to the city council of Dayton, Ohio, the Ohio Telegraph and Telephone Company of Columbus refused to accept the ordinance passed by the legislators extending the franchise of that company for a period of ten years.

The objection offered by the company was based upon the fact that the ordinance provided that the police department should be given free service over the company's lines.

The Lay of a Layman

By the T. E. Dopester

IT seems to be fashionable nowadays to hark back to the "good old telephone times." Chicago has had a recent inquiry on the part of the federal authorities who have grown curious regarding the machinations of the Bell company. Men from various parts of the country have been summoned to appear before Mary E. Bell, special examiner, to tell what they knew about telephone competition. They have been prying out lots of things, mostly ancient history, and for once in the course of human events the newspapers have been fairly decent. But before going into Miss Bell's show at the federal building, we want to do some harking back on our own account, to be in style, if for no better purpose. For be it remembered, it hasn't been a flower-strewn path that we've been traveling for the past five years. We have said over and over again that TELEPHONE ENGINEER was not a Bell-owned or a Bell-controlled trade journal, but there are some telephone men who refuse to believe it, even yet. It is pertinent, then, that we go back with you to the time before the establishment of TELEPHONE ENGINEER. This is made easy for us because of an editorial which appeared in the *Western Telephone Journal* February, 1908, written by Stanley Lichty, a fire-eating independent telephone operator of the old school. Having never printed this editorial in these pages, we give it space now because it is an essential part of the record. Harking back makes it timely:

The *American Telephone Journal* and *Sound Waves* have been purchased and consolidated by the McGraw Publishing Company of New York; and hereafter they will be published as one weekly paper, retaining the name of the former.

By this change *Sound Waves* is retired from the field, but the memory of what this publication has tried to do for the Independent cause will linger long in the minds of Independent telephone men. *Sound Waves,* during its existence, experienced a strenuous and varied career. It was first started as a house organ by a manufacturing concern; then it was sold to a publishing concern and published as a trade paper, and seemed to take on a new life for the time being; but circumstances and conditions were against its becoming a profitable enterprise from the standpoint of the publisher. About a year ago Ed J. Mock purchased *Sound Waves* and he built the paper up to a high standard of telephone journalism. Mock had set his ideals high and would have succeeded in making the paper a credit to the Independent movement had he not incurred the displeasure of certain advertisers who had been in the habit of dictating the policy of telephone publications published in Chicago. It makes a difference sometimes whether the word independent is spelled with a big or little "I."

Ed Mock used to be a newspaper man in Nebraska, but for five or six years previous to the time that he became interested in *Sound Waves,* he was associated with *Telephony* —a telephone publication controlled by a coterie of so-called strictly Independent manufacturers—and because he wanted to be on the square, and because he protested against hypocrisy and double dealing, he was placed on *Telephony's* retired list. *Sound Waves* has been merged with the *American Telephone Journal* and in time the name may be forgotten, but so long as the publication shall live in the minds of present day Independent telephone men, it will be remembered for what it was under the editorship of Ed J. Mock.

The *American Telephone Journal* has been an Independent telephone journal for a number of years—some eight or nine years—and William Henry McDonough saw to it that it was conducted in an Independent manner. "Mac" is now in Europe visiting the crowned heads and a few of the other dead ones. He may try to forget the many trials and tribulations that he has suffered during his missionary work in the Independent field; but we know him well enough to believe that he will not forget the friends that appreciated his efforts and his integrity of purpose. The *American Telephone Journal* will go on under the new ownership and it will no doubt be conducted as heretofore along the broad lines laid down by McDonough, but it will not seem just the same unless it can, in a measure, retain the personality which our friend Mac gave to it.

There has never been expressed any great amount of cordiality to each other through the columns of our several papers—it may have been that each one of us was waiting for the other to throw the first bouquet; however, the editor of the *Western Telephone Journal* has considered the men mentioned above as his warm personal friends. We worked as co-laborers in the field and not as fighting competitors.

The new journal will be "independent" spelled with a small "i." It believes that there is no reason for a conflict between the Independent and Bell interests, and that its mission should be that of covering fairly and freely the whole wide domain of telephony, for and against no interest, but only and always "for the art."

It may look that way at a distance, but to those of us who are still on the firing line, it looks different.

* * *

Some of our friends know all about why *Sound Waves* incurred the displeasure of certain independent telephone manufacturers, but they are strangely unfamiliar with the fact that it lost all the advertising of all of these so-called independent telephone manufacturers because it accepted the advertising of the Kellogg Switchboard and Supply Company. It was during those days when Kellogg was in the shadow of Bell ownership. Everybody declared that Kellogg was Bell—except the courts. I had hypothecated my "chips and whetstones" and had borrowed money on notes that my friends had endorsed with me to acquire *Sound Waves,* which was then published at Logansport, Indiana. The panic of 1907 had imposed the penalty of increase in interest rates and I was facing utter ruin when I accepted the Kellogg advertising and suffered the cancellations of all other telephone manufacturers' accounts. Even at this belated hour I cannot refrain from again thanking those auxiliary suppliers who were loyal to *Sound Waves* and were not influenced by the politics of the game.

* * *

That I would resent such tactics will be better shown when you finish with the affidavit submitted herewith—more "old stuff," but it has never been offered before and it is pertinent, now that antiquated scores are being aired in the federal court. This affidavit was prepared and other legal formalities had been entered into with a determination to interest the federal court in my particular case. It is evidence that has for many months created smiles instead of tears. Years are the surest panacea for wounds. The following was signed and attested and bears a date in January, 1908:

Ed J. Mock, being first duly sworn, deposes and says that he resides in the city of Chicago, Cook county, Illinois. That he is president of the Electricity Magazine Corporation, which is the publisher of a telephone trade journal known as *Sound Waves,* and that he is also the editor of said journal.

Deponent further says that said *Sound Waves* has a general circulation among telephone exchange operators, and particularly with that class of telephone exchange operators connected with the so-called Independent telephone industry as opposed to the so-called Bell interest.

Deponent further says that the Kellogg Switchboard & Supply Company has advertised its business of manufacturing switchboards, telephones and general telephone supplies in

said *Sound Waves* for the past six months, paying therefor the regular advertising rates demanded by said publishing company.

Deponent further says that during the month of October, 1907, a meeting of the Telephone Manufacturers' Association was held in the city of Chicago; that he is acquainted with substantially all of the members of said association, which is composed of the following named firms and corporations:

American Electric Telephone Company, of Chicago, Illinois, represented by P. C. Burns and J. G. Ihmsen; Swedish American Telephone Company, of Chicago, Illinois, represented by E. B. Overshiner; Chicago Telephone Supply Company, of Elkhart, Indiana, represented by G. A. Briggs; Vote-Berger Company, of LaCrosse, Wisconsin, represented by M. I. Berger; Sterling Electric Company, of LaFayette, Indiana, represented by W. E. Doolittle; Monarch Telephone Manufacturing Company, of Chicago, Illinois, represented by E. E. Yaxley; Western Telephone Manufacturing Company, of Chicago, Illinois, represented by C. L. Johnson; Dean Electric Company, of Elyria, Ohio, represented by W. W. Dean and A. E. Barker; North Electric Company, of Cleveland, Ohio, represented by C. H. North; Central Telephone & Electric Company, of St. Louis, Missouri, represented by James S. Cuming; Century Telephone Construction Company, of Buffalo, New York, represented by B. G. Hubbell; Stromberg-Carlson Telephone Manufacturing Company, of Rochester, New York, represented by W. Roy McCanne, and Telephony Publishing Company, of Chicago, Illinois, represented by H. B. McMeal.

Deponent further says that at said October meeting of said association a committee consisting of J. G. Ihmsen, E. E. Yaxley and C. H. North was appointed to determine the disposition of the publishers with reference to carrying the advertisements of the Kellogg Switchboard & Supply Company. That said committee called this deponent representing his said journal, *Sound Waves*, before it, and asked this deponent if the advertisement in deponent's said journal could be discontinued; to which deponent replied that said Kellogg Company was carrying advertisements in deponent's said journal, but the same could be discontinued. Then said committee asked deponent if he would drop said advertisement from the columns of said journal, to which said deponent replied that he would not do so at that time. Then the committee inquired of deponent if he would drop the advertisement of said Kellogg Switchboard & Supply Company from the November issue of said journal, *Sound Waves*, to which deponent replied that he would not.

Deponent further says that at the time of said interview with said committee, advertisements were printed in the columns of said *Sound Waves* for seven of the members of said association, as follows:

American Electric Telephone Company, Monarch Telephone Manufacturing Company, Dean Electric Company, North Electric Company, Central Telephone & Electric Company, Century Telephone Construction Company and Stromberg-Carlson Telephone Manufacturing Company. That prior to that time the Swedish American Telephone Company had used the columns of said *Sound Waves* for its advertising, but had withdrawn same, giving as the reason therefor that they would not continue their advertising while the advertising of the Kellogg Company was permitted in said journal. That since the date of said interview all of said seven members of said association have ordered cancellations of their advertisements. And deponent is informed and believes that said advertising has been withdrawn from his said journal because of the refusal of deponent to decline to discontinue the advertisement of said Kellogg Switchboard & Supply Company.

Deponent further says that said *Sound Waves* is published in the city of Chicago, and was entered as second class matter April 22, 1907, at the Chicago postoffice, and that the columns of said journal are open to all proper advertising, pursuant to the terms of the application for entry of said publication to the second-class mail matter, and that any house in good standing may advertise in said publication at the regular published rates, and advertisements of competitors in business are accepted at the usual rates without discrimination.

Deponent further says that his said company has a contract for advertising space in said *Sound Waves* with the Central Telephone & Electric Company, of St. Louis, Missouri. That James S. Cuming, the president of said company, submitted for copy in the space contracted for the matter which appears on page 33 of the January number of *Sound Waves*, a copy of which is hereto attached, marked "Exhibit A" and made a part hereof. This same advertisement appeared in the December issue of said *Sound Waves* and is authorized to continue until the expiration of the advertising contract of said Central Telephone & Electric Company.

* * *

"Exhibit A" was the most unique piece of trade paper advertising copy that ever passed through my hands. Jim Cuming, something of a fighter himself, in a fit of temper grabbed one of his envelopes, bearing the return card of his company, and wrote on it, "This space paid for by an independent manufacturer who declines to use same while advertising of manufacturers not strictly independent is accepted by the publishers." Jim sent this on as ad copy. I reproduced the envelope and all and haven't ever been wholly forgiven for it! Lichty was right about the big I and and the little i.

* * *

It was like a clap of thunder in a clear sky when I learned that James H. McGraw of the McGraw Publishing Company, New York, wanted to buy *Sound Waves* about then. I wasn't anxious to sell, but I was between two fires with all I had at stake. *Sound Waves* could not survive without more money and I had no way of getting more. The only alternative left me was to sell. I sold at a tremendous sacrifice, due to the losses sustained in a fight that had developed white heat, but a verbal condition of that sale was that McGraw would continue the Kellogg advertising. You all know that he turned turtle by asking relief from the Kellogg contract and making his peace with the Telephone Manufacturers' Association.

* * *

I continued with McGraw until he sold his "white elephant." I am not authorized to quote the gentleman, but I am sure, since his experience with it, I do not abuse confidence when I say he never felt kindly toward the telephone field as a fit place for dignified trade journalism.

* * *

My sale of *Sound Waves* was to James H. McGraw. I agreed with Mr. McGraw, in order to deliver the entire "good will" of *Sound Waves*, not to re-engage as a publisher of a trade journal. I mention this because it has since been openly charged that I violated this agreement. When Mr. McGraw sold his telephone publication my agreement with him ceased.

* * *

Telephone Engineer was established the moment I learned that McGraw was through with telephone journalism. I took a small office on the fourth floor of the Monadnock building, Chicago, and meant to prove only to myself that a telephone journal could go down the middle of the road, advocate a policy of telephone competition and treat the whole matter sanely. At the end of five years I am safe in saying that it can be done.

* * *

But it isn't easy. We have been charged by the independents with half the crimes on the calendar because Telephone Engineer permits the Western Electric Company to advertise in its pages. No edition of Telephone Engineer has ever appeared that did not say in italic type—*"This publication is free and independent of all business or house connections or control."* It is comforting at this Thanksgiving time to realize that independent operators are beginning to know that this journal to the trade has nothing up its sleeve; that it has only the welfare of telephone interests to serve and that it can be relied upon at all times to do its level best to serve those tremendous interests.

At the Mary E. Bell show, we get a lot of old matter. It is like cleaning out a closet. You find things that had been forgotten. Spread out in the record, the greatest interest attaches to the new date. The independents have been over in the dark corner of the stage. This inquiry has turned the spotlight in their direction. They loom large again. Telephone competition is necessary and vital. The oldest man in the independent fold nourishes in his heart the return of the good old days. We believe that the cycle of inactivity of independents has nearly run its course. Put your ear to the ground and maybe you will hear some rumbles in the general direction of Ohio.

* * *

In passing, you are reminded once more that TELEPHONE ENGINEER purchased Lichty's *Western Telephone Journal* in August, 1910. In taking over that strictly independent telephone journal, we added hundreds of subscribers, but no advertisements. Telephone journalism is a game.

Educating the User

The movement started to reduce the amount of unnecessary language used by telephone patrons is said to have caused a marked improvement, and operators report many subscribers to be struggling with the brief and courteous system.

Even the most optimistic expect that primitive methods of using a telephone will continue, but it is hoped that rural ideas regarding the telephone as a plaything, rather than an important factor in business affairs may be lessened.

There probably always will be men and women who will call a busy office and begin a conversation by using such a remark as "Who is this?" followed by, "Well say —listen—who is this at the 'phone?" "Do you know who this is?" "Can't you guess who I am?" The proper formula is to answer a telephone ring with: Jones & Company. To which the up-to-date persons replies: "This is Smith; I wish to speak to Mr. Jones."

The formula for residences most approved is to answer the telephone by saying: "Mr. Jones' residence," thus eliminating the effect similar to two parrots sitting on opposite perches and yelling "hello" at each other.

The telephone business has reached such a stage that changes and reformations are absolutely necessary. A great many people are at fault, in that they fail to realize that a man working in an office may be very busy, even though they are not. There are women who, probably unthinkingly, call an office and converse for a long time on a subject that is of no interest to the man who answers the telephone.

Labor Laws and Telephone Operators

Deputy Attorney General Hargest has presented to Commissioner Jackson, of the Labor Bureau of Pennsylvania an opinion bearing on the rest periods for women under the new women's labor law which has recently gone into effect.

The superintendent of the Bell Telephone Company has requested of Commissioner Jackson whether the law permitting women to work only six days in the week could be so construed as to permit some of the hours of the female telephone operators to rotate so that occasionally they would work seven days in one week in order that they could take turns in having Sundays off duty. Mr. Hargest says that the law preventing any female from being employed more than six days in the week is explicit and cannot be otherwise construed.

As to the rest period of forty-five minutes, the night operator may follow the course of her employment without interrupting the same for any lunch or meal period, the law specifically referring to "the mid-day meal." It is not incumbent, therefore, for the company to insist that there shall be a specific interval of time of forty-five minutes set apart as a night rest period.

The women operators of the Pittsburgh division of the Pennsylvania railroad are informed that in their case it is not within the true intent and spirit of the law to insist upon its being strictly carried out, as their rest periods, from the nature of their work, are frequent during the hours of duty.

Commissioner Jackson issued a statement in reference to the new law, in which he says:

"It is the intention of this department to enforce the law with which everyone is now, or should be, familiar, but not to be unreasonable about it. With a great new law, requiring many radical changes, going into effect, there will doubtless be instances of unintentional violation. We do not intend to work hardships on people in such cases or to come down suddenly on employers, but to give notice that the law must be complied with and that care and time can accomplish much toward straightening out what appears to be difficult of performance today."

Wisconsin Commission on Toll Service

In ordering the dismissal of the complaint of the Ettrick Telephone Company of Ettrick, Wis., the State Railroad Commission declares that it never was the intention of the physical connection law that free toll service should be given to any party. The Ettrick company claims that physical connection between its system and the toll lines of the La Crosse Telephone Company is made through the Western Wisconsin Telephone Company's toll board at Galesville, but it makes no charge for messages going through from Galesville to La Crosse. The Ettrick company asks to be placed on the same basis as the Western Wisconsin company. The commission holds that the La Crosse company and the Western Wisconsin company are the owners of the toll line, and that, under the circumstances, the apportionment of the toll revenues is no criterion for "judging the reasonableness of charges exacting of a connecting company, desiring the toll line facilities, but having no proprietary interest therein."

Discrimination Charged in Washington

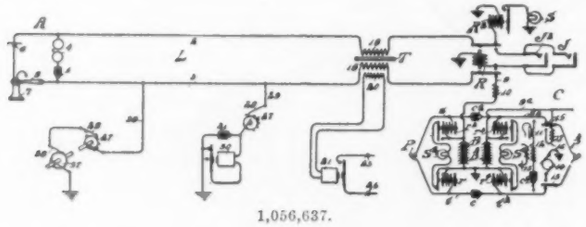
With the Washington (D. C.) public utilities law stipulating that it shall be unlawful for any person to accept a concession in the matter of service rendered by a local utility, the question of whether members of Congress have been favored by the regulations of the Chesapeake and Potomac Telephone Company gave promise of adding an interesting phase to the investigation of the company's business methods ordered by the Senate.

In explaining the resolution for the inquiry, which is to be made by the public utilities commission, Senator Norris of Nebraska, author of the resolution, stated that he was led to take the action because he was informed that, while the telephone company requires a yearly contract of all subscribers, it makes an exception in the case of and will terminate this contract for members of Congress and high officials.

Recent Telephone Patents

By David S. Hulfish

U. S. Patents No. 1,056,637. For a Combined Telephone and Fire Alarm System. To W. W. Dean, Chicago, Ill., Assignor to Consolidated Fire Alarm Company, New York, N. Y. The application for this patent was filed August 15, 1903. In connection with the ordinary speaking and signaling equipment of a central energy telephone exchange, and its telephone lines, a line is made to do double duty as telephone line and fire alarm line by inserting in it a balanced differential inductorium T. This relay has a third winding for induced currents and a third winding is connected to a relay for receiving fire alarm signals. The ordinary operations of the telephone line, for telephonic purposes, for speaking, for ringing, or for signaling to the central office, are accomplished over a metallic loop circuit, and do not produce currents in the third winding of the inductorium T. Signals



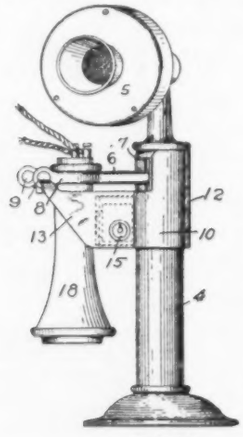
1,056,637.

through earth from the fire alarm call senders do unbalance the inductorium T and thus operate the relay for fire alarm signals.

1,056,655. For a Lock for Telephones. To Alfred Fornander, New York, N. Y. To prevent any unauthorized use of a table telephone set, a locking device is provided. The feature of novelty is that the locking device is not permanently attached to the telephone, but when unlocked is entirely removed. A pair of clamping parts for the column of the telephone set have a hook extension which engages the lever of the telephone set and prevents the lever from rising.

1,056,711. For an Improved Knob Insulator. Ferdinand Schaube, Jersey City, N. J. An insulator of the porcelain knob type, made in three parts, with wire grooves so arranged as to hold two wires conveniently to permit the circuits to cross.

1,056,725. For a Junction Block for Electric Connections. Albert K. Andriano, New York, N. Y., assignor to Direct-Line

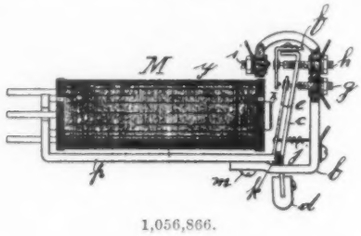


1,056,655.

General Telephone Company, San Francisco, Cal. The combination of a base having parallel grooves for cables, a raised insulating support bearing conducting arms for attachment of the cable conductors, the arms arranged in two series, one series longer than the other and in a different plane.

1,056,866. For an Improved Relay. Harry G. Webster, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill. This application filed July 5, 1906. This relay is adapted for automatic telephone exchanges of the two-wire-line method of signaling, in which the signals from the telephone to the central office are sent in the nature of long and short electrical impulses. In such a central office it is necessary to have means for distinguishing between long and short impulses. This usually is done by having a quickly responsive relay which responds to the short impulses of current, and a sluggishly responsive relay which responds only to the longer impulses. Mr. Webster's improved relay as disclosed in this patent offers one relay for the two purposes, the relay being provided with such equipment upon its armature that a first local central office circuit is closed in response to each short impulse of current flowing through the relay spool, and a second circuit is closed in case the current through the relay spool continues for a sufficient length of time. A light armature is positioned near the core which quickly makes contact with the hooped end of the pivoted part *f*. The part *f* is pivoted at the bottom and carries the pendulum weight *d*. If the light armature pulls steadily against the part *f* that part will be caused to move to close a second local circuit, but it will not be moved by a brief impact of the very light armature.

1,057,500. For a Lock-Out Switch for Party Telephone Lines. John G. Roberts, Chicago, Ill., assignor to Western Electric Company, Chicago, Ill. This application filed July 26, 1906. A polarized magnet at the party line telephone responds to currents of one polarity to advance a ratchet, step-by-step, without closing any local circuit as the ratchet advances. When the desired position of selection for the ratchet has been attained, a current of reversed polarity causes the magnet to release a spring-actuated device to close a local circuit at the station desired, the remain-



1,056,866.

ing stations thus being left on open circuit, or "locked out."

1,057,507. For an Improved Coin Collector. DeWitt C. Tanner, Short Mills, N. J., assignor to Western Electric Company, New York, N. Y. Improved details in a coin collector by which the central office telephone operator is able to cause collection at the telephone of proper coins for prepayment for a telephone conversation.

1,057,516. For an Improved Table Telephone Set. Anna B. Allen and Leonard Day, New York, N. Y. The portable telephone set has a base arranged with a top like a scale, the circuit-controlling switch being controlled to open whenever the receiver is laid upon the scale pan of the base.

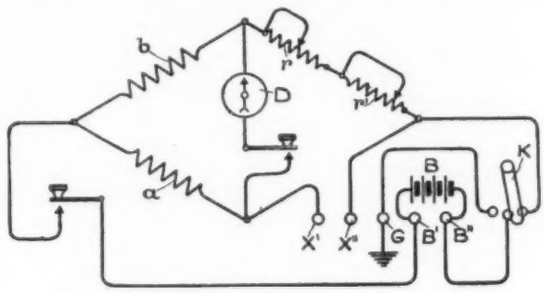
1,057,595. For a Central Energy Telephone System. D. L. Temple and C. L. Goodrum, Altantic City, N. J., assignors to American Electric Company, Chicago, Ill. This application was filed March 1, 1902. Novelty is seen in the method of effacing the line lamp of a calling line. The line relay has two windings, one of which is permanently in circuit with the line, to receive the calling signal. The companion winding passes to the jacks of the line and when a plug is inserted the two windings are connected in multiple, being then differential, and neutral upon the core, thus demagnetizing the relay, releasing its armature, and effacing the line lamp. The two windings thus placed in multiple have no cut-off relay, the current for transmitter supply being furnished to the line through the line equipment rather than through the circuits of the connecting cord pairs.

1,057,817. For an Apparatus for Fault Location on Electrical Conductors. Herbert N. Friendly, Portland, Oregon. This application was filed June 10, 1907. In an electrical testing device of the Wheatstone-bridge type, a rheostat or adjustable resistance has a set of three scales, two of them movable with respect to the third scale, whereby two readings may be added mechanically and recorded by the two movable scales, and the sum thereof mechanically subtracted from a third reading which is directly readable upon the third or fixed scale. The object of the total testing device is the simplification or total elimina-

tion of the arithmetical calculations usually necessary when making measurements and tests, such as resistance readings with leading-in wires, Varley loop tests for faults, etc.

1,058,120. For a Telephone Muffler. Maximilian Weil, New York, N. Y. A muffler or voice shield over the telephone transmitter is provided with vacuum-jacketed walls.

1,058,176. For a Selective Signaling System. William E. Harkness, East Orange, N. J. In a step-by-step selector, the selector magnets have a series resistance, a portion of which is shunted by the selector contact points at any station when the selector is adjusted to select that station.



1,057,817.

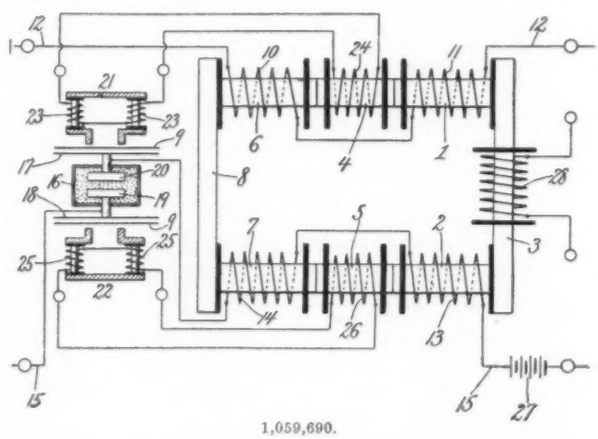
1,058,364. For a Cable Hanger. Frank B. Hall, Newton Falls, Ohio. The hanger is of the marlin loop type and the novelty is found in the form of the wire hook or saddle for the messenger wire.

1,058,505. For a Coin Telephone System. Howard J. White, San Francisco, Cal. The induction coil of the telephone set is used as a magnet for dropping the deposited coin after the conversation for which the coin was paid.

1,058,631. For an Alarm Attachment for Telephones. Adolph Schlosser, Dodge, Nebr. A bell gong within the telephone box is arranged with mechanism to deliver a mechanical stroke upon the gong whenever the receiver is lifted from its hook.

1,058,872. For a Signaling System. Otto T. Lademan, Milwaukee, Wis. In a step-by-step selector, stepping and releasing magnets are provided, and a circuit within the selector reduces the resistance of the circuit of the releasing magnet while the stepping magnet is energized.

1,058,903. For an Automatic Telephone Exchange System. John N. Reynolds, Greenwich, Conn., assignor to Western Electric Company, New York. The novelty is found in a specific arrangement of circuits by which a selector, controlled by a call sender, has a circuit interrupter which in turn controls the call sender.



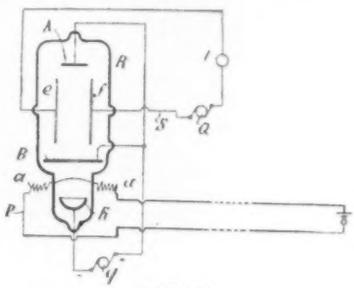
1,059,690.

1,059,073. For an Antiseptic Attachment. Irving S. Rosenblatt, San Francisco, Cal., assignor to Perpetual Germ-Proof Telephone Mouthpiece Company, San Francisco, Cal. An extension mouthpiece is provided, and between the transmitter casing and the funnel of the mouthpiece an annular chamber is formed, the chamber being charged with a loose annular block of solid disinfectant.

1,059,690. For a Telephone Repeater. David H. Wilson, New York, N. Y., assignor to David H. Wilson and Robert Bines, trustees, New York, N. Y. The feature of novelty is in the arrangement of windings upon the cores of the inductorium. A carbon cell resistance is controlled by two diaphragms and receiving magnet, both of which are receiving currents inductively from the line circuits through the inductorium.

1,059,745. For a Telephone Metering System. Edward H. Martin. Webster City, Iowa. The telephone meter or call counter in this invention is mounted within the shell of the telephone receiver. Operating buttons project from the receiver shell, by which the counter may be advanced to count each time the receiver is used for listening purposes.

1,059,758. For a Telephone Line Signal. William Pothen, Murdock, Minn. An electrical pole change is arranged in connection with the striking train of a clock movement, in such manner that the current from the pole changer may be led to a telephone line and may cause the telephone bells of the line to tap to indicate the hours as struck by the clock.

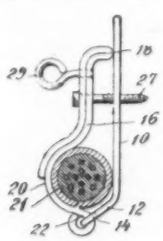


1,059,763.

1,059,763. For a Telephone Speech Relay. Eugen Reisz, Vienna, Austria-Hungary, assignor to the firm of Relais-Gesellschaft M. B. H., Vienna. An exhausted discharge tube is used, with cathode and anode, and the action of the cathode is modified by the received speech currents. Secondary electrodes are placed within the tube and so positioned that the path from cathode to anode lies between the secondary electrodes.

1,060,014-15-16. For an Improved Cable Clamp. John E. Ogden, Brooklyn, N. Y. The improved clamp draws the cable against the wall or equivalent surface to support the cable, and also offers a bridle ring for distributing wires from the terminal of the cable.

1,060,211. For a Desk Telephone. Alexander C. Reid, Genoa, Ill., assignor to Cracraft, Leich Electric Company, Genoa, Ill. The new feature is found in the hoop switch. This is located in the base of the telephone set and comprises a movable member which acts upon the switch spring as the hook lever moves. There are provided also guide springs to prevent vibration of the movable parts.



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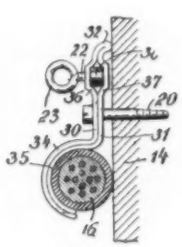

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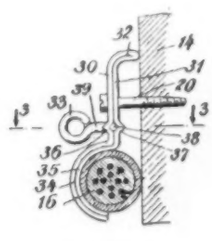


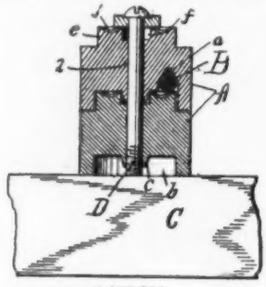
1,060,016.

1,060,212. For a Selecting Mechanism. Charles S. Rhoades, Jr., Sandwich, Ill., assignor to the General Railway Equipment Co. A step-by-step signal-receiving device, having stepping and holding pawls both normally disengaged from the stepping element, and having polarized electromagnetic means for controlling the pawls.

1,060,214. For a Signaling System. Harry O. Rugh, Sandwich, Ill., assignor to the General Railway Equipment Company. The signaling system has two call boxes at the central office and adapted for signaling the stations of the line. At each call box is a busy signal or indicator which displays its signal at either box whenever the other box is in use.

1,060,308. For an Intercommunicating Telephone System. Leon D. Barrows, New York, N. Y., assignor to American Telephone & Telegraph Company, New York, N. Y. The invention pertains to operating an intercommunicating system with trunk lines to a central-energy exchange, and provides holding coils for holding the signals at the central office, and magnets for automatically retaining the holding coils in circuit.

1,060,886. For an Improved Knob Insulator. John E. Bicknell, Findlay, Ohio, assignor to the Findlay Electric Porcelain Company, Findlay, Ohio. In this improved knob insulator, as many wires may be clamped as is desired, by using a long screw or bolt and stringing upon it as many insulating knobs as required, then clamping a wire between each two knobs. Each knob or section has a countersink and wire groove on one end and upon the other end a projection to fit the countersink of the next section and to clamp the wire.



1,060,866.

Consolidated Company Files Deed

Representatives of the Consolidated Telephone Company of Pennsylvania have filed a deed in Recorder Martin F. Judge's office, at Scranton, Pa., the paper being similar to those filed in every county where the corporation is doing business. The company was recently taken over by a number of capitalists, including Alvin Markle of Hazleton, Harry C. Trexler of Allentown, John Graham and Murray Gibson of Philadelphia, William L. Connell and Colonel L. A. Watres of Scranton.

The sale price is given at $50,000, and represents but a small share of the actual value. The change of ownership took place several months ago and involved one of the biggest telephone deals in this end of the country.

The main office of the company will be in Philadelphia, with William B. Given as the president. No change in the name of the corporation is planned, the old title being agreed upon by the new owners.

The plans call for the expenditure of more than a million dollars in improvements.

The exchanges affected by the deed filed include those of the Lackawanna of Scranton, the Peoples of Wilkes-Barre, Carbondale Telephone Company, Anthracite of Hazleton, Lehigh of Allentown, Consolidated of Reading, Slate Belt of Slatington, Overland of Lehighton Carbon of Mauch Chunk, Hinesdale Telephone Company, Berwick Telephone Company, Easton Company, Warren of Phillipsburg, N. J., and the Interstate Telephone Company, with lines in the city of Philadelphia. There are arrangements effected through which long distance messages can be transmitted to the Keystone Telephone Company of Philadelphia, the American Union Company, the Interstate Company of New Jersey, the Pittsburg and Allegheny Company of Pittsburg, and the Frontier and Inter Ocean Company of New York.

Government Ownership

Quite manifest is it that there is an increasing purpose among socialistically inclined congressmen and other public functionaries in Washington to have the government take over the telegraph and telephone service, making it a part of the political machinery of the nation.

The indications are that agitation to have the government purchase and operate the telegraph and telephone is to be persistently continued, and it may be that the agitation will lead to a favorable consideration of the matter by the congress that will meet on the first Monday of December, or if not then by some later congress.

Former Postmaster General James, a very high authority, has never favored government ownership of the telegraph and telephone business. He has gone so far as to say that were the postoffice department managed with the same skill, energy and business capacity that characterizes the management of our great corporations, it would be practicable to reduce letter postage from two cents to one cent, and still leave a balance in favor of the government.

There is not a particle of doubt that a better mail service than we now have could be had under competent private management, at a cost of at least fifty million dollars a year less than the people are now paying. Neither our government nor any other can manage the telephone and telegraph with half the economy and efficiency of private ownership and direction.

More Telephones on the L. & M.

The equipment of the train dispatching telephone service between Birmingham and Montgomery, Ala., has been completed. The system is said to be the most perfect devised. Booths have been erected at every station where there is not a telegraph office and at several points between stations, so that in case of trouble a train crew can talk personally with dispatchers in Montgomery, Birmingham or any point between these places.

The Morse system of telegraphy will be used but only for commercial and railroad messages, the train dispatching being done entirely by telephone.

The telephone system has been in operation on the Mobile and New Orleans division of the Louisville and Nashville for some years, and on the Mobile and Montgomery division poles have been distributed, while copper wire and equipment enough to furnish the entire division has been stored in Montgomery for several months, litigation with the Western Union Telegraph Company preventing the installation of the service.

On that part of the South and North division between Montgomery and Birmingham the system is ready and will shortly be used. There is a gap between Birmingham and Decatur on the South and North that will be filled in soon after the annual election of the South and North in Montgomery. There is another gap between Decatur and Nashville, but it will soon be filled in as will the division between Nashville and Louisville. The system is in use between Cincinnati and Louisville and on some of the short line divisions in Kentucky, and when the St. Louis and Memphis division are equipped the entire Louisville and Nashville system will be using the telephone train dispatching system.

Sell Red Cross Seals By Telephone

With the coming of Christmas comes the annual sale of Red Cross seals and the sale this year is to be one of the most systematic yet held.

One particular feature of the sale is to be conducted by "telephone committees" of young ladies in different cities. Each of the young ladies on a committee will take a page from the telephone directory and telephone to each residence number on it, asking the subscriber to buy some of the seals. No order will be taken for less than 25 seals and the orders will be mailed. The person buying the seals may send the money in after receiving his order.

Of Interest to the Trade

Automatic Engineers in Australia

This is a group picture of the Automatic colony in Australia, who include representatives and technical experts sent out by the Automatic Electric Company to take part in the large installations now in progress in that country. Reading from the bottom up, they are A. A. Burch, W. H. Ricksher, George Schoemaker, F. L. Baer, H. S. Janes, J. K. Barrington, C. P. Snowdon and Frank Kessler.

Mr. Burch is special representative of the Automatic

Automatic Engineers in Australia. Reading from the Bottom Up, A. A. Burch, W. H. Ricksher, George Schoemaker, F. L. Baer, H. S. Jones, J. K. Barrington, C. P. Snowdon, Frank Kessler.

Electric Company and of Automatic Telephones, Australasia, Ltd. Mr. Ricksher is chief engineer of Automatic Telephones, Australasia, Ltd., while Mr. Baer is consulting and advising engineer of the same corporation. The other gentlemen are expert installers and maintenance men.

The Australian government is very favorably impressed with the merits of automatic apparatus and is planning to convert practically the entire telephone system of the commonwealth to this type of apparatus. Already some 14,000 lines have been installed or are in course of construction.

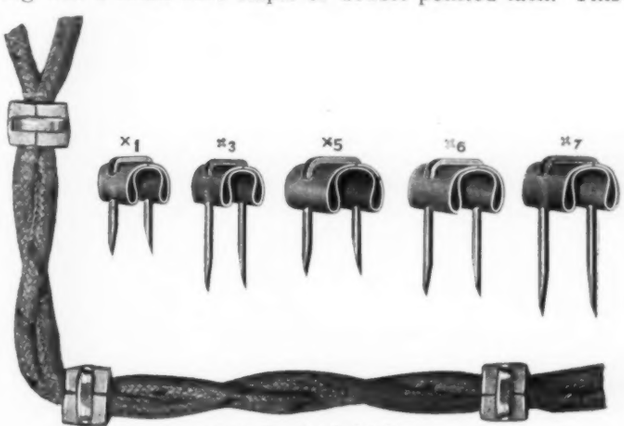
Interior Telephone Wiring

By E. J. Burke.

Low voltage interior wiring for telephone and telegraph has been very slowly granted the attention it deserves. This is partly due to two causes. In the first place the voltage and current on such lines is so small as to eliminate any possibility of arcing at a short circuit or ground and thus causing fire. There being no danger in using any method for putting up such interior wiring, telephone and telegraph companies were slow to consider the amount of time and energy wasted and consequent loss of money due to such careless methods.

In the second place, for a long time there was no really practical and effective driven wire support on the market which afforded the necessary mechanical protection.

At first the best driven wire support for such wiring was a small bare staple or double pointed tack. This



Blake Insulated Staples.

furnished a neat and apparently good support and was largely used for such interior wiring. The telephone companies were the first to discover that these bare staples, when driven over their twisted pair wires, would in a short time corrode. This corrosion of the metal would quickly destroy first the cotton covering on the wire, then the rubber covering, and then there was a short circuit and the telephone in that particular house was out of commission. While the trouble was quickly remedied when found, it frequently required several hours' time of a high-priced trouble hunter to locate it.

The telephone companies then adopted the method of driving the staples over one leg only of the twisted pair wires. This prevented short circuits caused by a wireman driving a staple too hard and cutting through the insulation on the wire, but did not prevent the corrosion of the metal gradually destroying the insulation on both wires as before and causing short circuits and grounds which, until found and removed, put that particular telephone out of business.

A staple was needed having a firmly fixed insulating

saddle under the head which would give the required mechanical protection to the insulation on the wire and prevent the insulation from coming in contact with and being destroyed by the bare metal of the staple. It is also necessary that this insulated staple should have good driving qualities, that is drive easily into woodwork of various kinds without splitting the wood or itself bending and skating, and that the insulation should be so well fixed that it could not possibly fall out when the staple was being driven. As soon as such a staple was placed on the market it was at once taken up by the most up-to-date telephone companies, which realized that their cost of trouble hunting on interior wiring, due to defective supports, was running into thousands of dollars per year.

An insulated staple of proper design and construction driven over all the wire furnishes absolute protection to the insulation on the wires, holds the wires firmly and will hold the slack. When turning corners an insulated staple holds all the wires together with the strain on all of them, still affording perfect protection to the wire.

Blake Cleat.

The insulation on an insulated staple can be made of durable fiber which will last forever and cannot be pulled off. Staples can be used over single ground wires.

The above covers interior telephone wiring where it can be run over woodwork and a driven wire support used. Where wiring must be run over plastering or where a screw fastened support is desired, a cleat is necessary.

The requirements for a proper form of cleat are that it should be strong, durable, hold the wire effectively, and small and inconspicuous as possible. The cleat should be of such material as not to split or crack either in handling or when screwed up tight enough to hold the slack of the wire.

It has been proved that a little extra money expended in buying the proper material for interior telephone wiring will pay for itself many times over in saving the time and expense of hunting small troubles and interruptions to service due to short circuits, grounds and even open circuits.

Automatic Traffic Distributor for Indianapolis

An order for 700 lines of automatic traffic distributer apparatus has just been placed with the Automatic Electric Company, Chicago, by the Indianapolis Telephone Company of Indianapolis, Indiana. This equipment is to be placed in a new branch exchange to serve a large residential section in the northern part of the city and will have an ultimate capacity of 3,000 lines. It is also so designed that should the Indianapolis Company decide to change its entire plant to complete automatic operation, the switches installed at this time may be utilized to full advantage in that connection.

The apparatus consists of Keith line switches for each of 700 subscribers' lines. These switches have access to 70 trunks terminating in operators' positions, at a multiple manual switchboard of Automatic Electric Company's manufacture. The switchboard is to consist of three standard sections of three positions each, having an eight panel multiple section with the multiples appearing in each five panels in order to make the operators' reach as short as possible. The multiple jack space is to be arranged to accommodate an ultimate of 3,000 multiple jacks in each five panels, as well as 150 outgoing trunk jacks to other exchanges.

The first position is not to be equipped and the second and third positions are to be equipped with incoming plug ending trunks from other exchanges, the second position to be wired for 30 such trunks, but equipped only with 10 at the present time, while the third position is to be wired and equipped for 30 trunks. Positions 4 to 7, inclusive, are to be used for plug ending trunks from the subscribers' line switches.

The immediate installation is also to include a main and intermediate distributing frame, complete power plant, chief operator's desk and wire chief's desk.

Upon a subscriber raising the receiver from the hook, the switch connected to his line is actuated, instantly selecting a non-busy trunk, and lighting a signal lamp at the switchboard. His line is also connected to the operator's head receiver, so that it is not necessary for her to operate any key to receive his order. If the number desired is in her exchange, the operator plugs into the proper multiple jack and presses a ringing bottom. Plugging into a jack cuts off her head receiver and pressing the button starts the automatic ringing. If the called subscriber's line is busy, she plugs the trunk line into a "busy" jack, which gives the calling subscriber an automatic busy signal, and frees the operator from the call. If the call is for another exchange, the operator handles it in the ordinary way, by an order wire and trunk. The equipment is so arranged that it can handle party lines, selective ringing of four frequencies being provided.

The automatic traffic distributer is designed to simplify the work of the operator, since she will have single end cord circuits in place of the usual double cord circuits. She will be provided with a listening key in case of re-calls, or for other supervisory purposes, but it will not be necessary for her to manipulate it to complete original calls. A simple pressure on a button starts the automatic ringing. Furthermore, the automatic traffic distributer system is so arranged that the calls to each operator come in a steady flow, no faster than she can handle efficiently, but without lulls.

These features, it is believed, will enable the operator to give more uniformly prompt attention to calls, and will also result in a considerable saving to the company in operating expenses, for it is computed that with a busy hour calling rate of one per line, the present average for the Indianapolis branch exchanges, two operators will be able to serve the board, which normally would require five. Should, however, the calling rate be considerably higher than this, some of the line switch trunks can be switched to one or more of the additional positions equipped in the switchboard and more operators provided. These additional positions can also be used for student operators, since as few trunks as may be desired can be switched to them, according to the learners' ability in making connections.

At off-peak times, all but one position can be made "busy," and all calls will then be trunked to the single operator on duty. In this way the entire board will be covered by the single position and no decrease in operator's efficiency will result, as is the case when less than the full quota of operators is handling the calls at an ordinary manual board.

Work on the construction of the automatic traffic distributer apparatus has been started, and it will be in operation early in the coming year.

Telephone Exhibits at Panama-Pacific Exposition

The woman who uses her telephone as a medium of gossip; the banker who limits his telephonic talk to sententious or laconic utterances of syllable economy; the youth who entrusts his amorous messages to a receptive transmitter and "holds up" a ten-party line while he pleads his cause with his adored one; the angry gentleman of limited physical prowess, but unlimited wrongs, who tells his muscular enemy what he thinks about him from the safe distance of a telephone booth, and the merchant whose inter-city enterprises require the ubiquity of presence that the telephone provides, will all be interested visitors at the exhibit to be made by the American Telephone and Telegraph Company at the Panama-Pacific International Exposition in 1915.

To make a proper and fitting demonstration of the universality of the telephone and its unlimited usefulness, the American company, with its associated telephone companies and the Western Union Telegraph Company, will erect a building within the Palace of Liberal Arts, wherein all that is most interesting in the history of the telephone; the development of its resources of usefulness and convenience; its evolution from the first one over which human speech was first transmitted by Professor Alexander Graham Bell; the growth of the business since its inception to date in five year epochs; and many other interesting things will be installed.

In one of the enclosures of the Telephone and Telegraph buildings there will be presented a series of lectures, illustrated by motion pictures and other views, explaining and describing many of the interesting features connected with the world-wide service of telephone and telegraph. In this auditorium there will be demonstrations given of long distance telephony by which the audience—which may number 300—will be brought into auditory touch with many distant points.

The student of telephony and its related crafts will be given much to instruct him, while the ordinary layman and everybody, indeed, who knows a nickel-in-the-slot telephone from a dry battery, will be entertained by the proposed exhibit of the original forms in which telephones and transmitters made their appearance; exterior views of many telephone buildings throughout the country; interior views showing operators at work, and various details of the working service; views of operators in the training schools; operators' luncheon rooms and recreation equipment, installed by the company; the laying and splicing of submarine and underground cables; battery and power plants in operation; illustrations of simultaneous telegraphy and telephony over the same wires; showing the method whereby three telephone messages and eight telegraph dispatches are sent at once over four wires without interference; original forms of telegraph instruments and their development to their present perfected state; mysteries of the cable service, with illustration of siphon recording; telegraphic time service showing how clocks in a community are regulated to an accurate uniformity from a single station such as Mount Hamilton; various illustrations, methods and appliances of the Western Electric Company, showing processes in the manufacture of cables, the installation of wires, the winding of magnets and many other wonderful inventions and applied operations which, following in the wake of Professor Bell's invention, have added incalculably to the comfort, convenience and security of mankind.

N. C. Kingsbury, vice-president of the American Telephone and Telegraph Company, says that he believes the plan and scope of the forthcoming exhibit of his company will be found to comprise a demonstration of a universal service of intercommunication such as has never been before assembled.

International Motor Company Injunction Dissolved

The following announcement regarding the International Motor Company was authorized by the officers of the company:

Considerable publicity has been given to proceedings brought by George E. Blakeslee, a stockholder to the extent of 187 shares preferred stock, in which he asks for the appointment of a receiver and an injunction prohibiting the company from borrowing other funds. His application for a receivership and permanent injunction has been dismissed by the court.

Plans have been completed under which the existing or future merchandise creditors of the company will have unusual protection for credit extended. With the exception of bills for merchandise, the company will have practically no obligations to meet for the next three years, beyond its current requirements.

This company is one of the leading manufacturers of motor trucks. The company's annual business has grown until it now reaches approximately $4,000,000.

Much favorable comment among motor truck users in New York City has been made regarding the ability of the company to finance and cause to be erected a most modern and efficient truck service station. This building now stands at West End Avenue, occupying the entire block from 63rd to 64th streets, and represents an investment, with machinery, equipment, etc., of nearly a million dollars.

Blake Tube Flux for Soldering

The Blake Signal & Manufacturing Company, Boston, Mass., has hit upon the plan of putting up a soldering flux in a collapsible tube with an aluminum spout in the manner shown in the illustration.

The flux is a paste of about the consistency of vaseline, and is of the best quality. Strong acids undoubtedly clean the surfaces to be soldered well, but they continue to eat and corrode the substance so that in a short time considerable damage results. This will not happen with Blake Tube Flux. The tube, being tin, is durable and yet perfectly flexible. The spout is of aluminum and will

Blake Tube Flux.

not become clogged nor soldered up, and permits just the required amount of flux to be put exactly on the spot desired. This insures a good, clean job of soldering. With flux put up in tube form there is no waste, no mess, no splint needed, no box cover to get lost, no bottle to turn over or break, no accumulation of dust and grit; the last squeezed from the tube is as good and clean as the first. Two hands are not needed to apply this flux, for it may

be applied at the same time as the soldering iron. In fact, in most cases, the heat of the iron applied at the end of the aluminum spout will cause a sufficient quantity of flux to flow.

The Blake Tube Flux is handy for all kinds of soldering and easy to carry around. Each tube contains two ounces of flux.

Another Automatic Electric Bulletin

"Instructions for Substation Installations" is the title of the latest bulletin issued and distributed free by the Auomatic Electric Company, Chicago, manufacturer of automatic telephone apparatus. It was prepared by Bernard C. Groh of the company's technical staff, and is illustrated by diagrams. It contains a large amount of information which should prove valuable to all engaged in this branch of telephone work, which, as the bulletin points out, is of great importance to operating companies, since a slovenly installation of a patron's instrument will go far toward prejudicing him against the service.

This bulletin is the third dealing with telephone technique to be published by Automatic Electric Company and is one phase of the work being carried on by its service department. Its long experience in the telephone field has enabled the company to gather a great mass of data on such subjects, and the fact that it is placing this at the disposal of all operating companies, whether operating automatic or manual apparatus, is highly to be commended.

The latest number of *Automatic Telephone*, the monthly house organ of the Automatic Electric Company, has just been issued and is No. 7 of volume one. It compares favorably in appearance and interest with the previous issues of this unique publication. The "news stories" of this particular number deal principally with several of the recent contracts and installations made by the Automatic Electric Company, while a sketch of the telephone career of J. L. W. Zietlow, president of the Dakota Central Telephone Company, adds interest to the issue. Several technical articles dealing with telephone subjects and prepared by members of the company's engineering staff should prove of value to men engaged in this line of work.

Transcontinental Lines

Step by step, human ingenuity overtakes and masters the obstacle just ahead, thus clearing the way for the advance of practical development, says G. E. McCarn in the *Mountain States Monitor*. By such a process have the long distance telephone circuits of the Bell system been from time to time extended, until today it is quite generally known by telephone people, and probably to some extent by the general public, that telephone conversations between New York and San Francisco will be a reality with the opening of the Panama Exposition in 1915.

The lines from New York to Chicago and from New York to St. Louis were looked upon less than five years ago as representing the feasible limits of long distance transmission. Two years later, however, the American Telephone and Telegraph Company's engineers had wrought advances in the art (notably the loading and phantoming of No. 8 copper circuits and the loading of the phantom), and another step forward had been taken, a step which added more than one thousand miles to the distance the human voice could travel, and which put Denver in direct telephonic communication with New York City.

Unceasing study and experimental work on the part of the engineers since the completion of the New York-Denver line have developed the art of long distance transmission to a point that permits of the final and longest step in spanning the American continent with telephone circuits, and it has now become the responsibility of the plant forces of the Pacific Telephone and Telegraph Company and the Mountain States Telephone and Telegraph Company to construct the lines between Denver and San Francisco.

When completed, the transcontinental lines will comprise four No. 8 B. W. G. copper wires, so arranged as to create a "phantom group" of two physical circuits and one phantom circuit, all of which will be loaded.

Six million pounds of copper wire, supported on one hundred and forty thousand poles, will form this great highway for ocean-to-ocean conversation, but the intricacies of these talking circuits demand far more than the mere stringing of wire on a succession of cross-arms, and their operation will not be successful unless the construction work is executed with skill and precision.

In the Mountain States territory the first field work was a replacement inspection of the existing pole lines which are to form a part of the through line; close upon the heels of these inspectors came measuring gangs, chaining the exact pole-to-pole distances. These precise measurements are indispensable to the engineers in working out the scheme of transpositions, which, with the proper vertical and horizontal separation of wires and many other details of construction, must be specified and executed with exactness when applied to this highly efficient, but decidedly sensitive, circuit arrangement.

While these operations were in progress, surveyors were laying out the new lines which must be constructed to complete the system between Denver and Salt Lake. Orders for construction material were being rushed to the manufacturers and the superintendent of construction was making up crews, arranging camp outfits and organizing generally for active operations in the field. Today a dozen construction crews are at work between Denver and Salt Lake, doing all in their power to push to completion the lines in that section of territory where exposure to early storms is considered probable.

The Pacific Telephone and Telegraph Company is doubtless fully as actively engaged in extending its lines eastward to meet the others at the Nevada state line, where the final tying in of the wires of the respective companies will mark the completion of the world's longest telephone line.

National Association's New Directors

The National Independent Telephone Association has elected four new directors to take the place of the four who resigned to organize the Independent Telephone Association of America. The new directors are W. G. Brorein of Tampa, Fla.; Charles West of Allentown, Pa.; W. C. Handlan of Wheeling, W. Va., and C. E. Tarte of Grand Rapids, Mich.

The directors who resigned were: E. B. Fisher of Grand Rapids, Mich.; G. W. Robinson of Minneapolis, Minn.; Richard Valentine of Janesville, Wis., and E. D. Schade of Johnstown, Pa.

The National Association also elected J. B. Earle of Waco, Tex., secretary-treasurer to succeed Mr. Valentine.

Kansas Convention Date Fixed

Salina will be host to the telephone men of Kansas for three days in the early part of December, according to announcement of F. A. MacKinnon, secretary of the State Telephone Association. Some 200 telephone managers are expected at the meeting and there will be a large number of representatives of telephone supply houses present.

When the telephone men met at Hutchinson last winter, Manager VanTrine was instructed to invite the convention to meet in Salina. He extended the invitation but no action was taken on it at the time. Several other cities also invited the convention, but after considering the claims of the various places, the executive committee decided on Salina.

One of the features will be a large number of moving pictures representing various phases of telephone work.

The convention will be held December 9, 10 and 11.

Date Set for Cleveland Inquiry

Cleveland's telephone situation will be investigated by the Ohio Public Utilities Commission at a hearing January 6.

Oliver H. Hughes, chairman of the commission, announced that the commission will hear the charges of Harrison B. McGraw, that competition has been stifled between the Cleveland Telephone Company and the Cuyahoga Telephone Company in Cleveland and that the interests controlling them are planning a merger.

On the following day, January 7, the commission will take testimony on the complaints of Councilman James J. McGinty against the service of both the Cleveland and Cuyahoga companies.

The date of hearing the McGraw charges had been originally set for December 16, but the commission decided more time was needed for preliminary work.

Radiogram by Railway Telephone

A remarkable phenomenon is reported by a Canadian Pacific railroad dispatcher at Vancouver, B. C. Train dispatching is done by telephone, and while listening at his instrument the dispatcher picked up a message in the regular longs and shorts of the Morse code. Being an expert telegrapher he could follow the message, which was a wireless from some vessel at sea announcing her approaching arrival at San Francisco.

Apparently the telephone wires had acted as aerials. The name of the vessel was not given, but a number signal instead.

Brevities of the Business

PERSONAL NOTES.

Sir William Preece has passed away in London after nearly 60 years of activity in scientific and electrical circles. He was prominent in all branches of electrical development, and was concerned in early telegraph and telephone work, as well as the later wireless experiments. His name is known everywhere in the civilized world that electricity and its uses are studied.

P. C. Gettins, the local district manager of the Mountain States Telephone Company at Tucson, Ariz., has been transferred to take charge of the Phoenix district and has entered on his new duties. His position at Tucson will be assumed by H. E. Pilloud, manager for the company at Debing.

Volney Elstun, for years secretary and assistant treasurer of the Cincinnati and Suburban Bell Telephone Company of Cincinnati, has been elected treasurer for the company, to succeed the late W. A. Blanchard.

George Hall of South Bend, Ind., has been made manager of the Home Telephone Company of Dowagiac, Mich.

Thaddeus Lane, president of the Interstate Consolidated Telephone Company, at Spokane, Wash., was the guest of honor at a dinner given by the business and professional men at the Spokane County Club recently.

E. B. Fisher of the Citizens Telephone Company of Grand Rapids, Mich., has returned from a meeting of the board of the Home Telephone Company of Muskegon. It is proposed to build a new exchange there and install a new system if financial arrangements can be made and adequate rates secured.

G. L. Wright, formerly connected with the Southern Bell Telephone Company at Jacksonville, Fla., has been put in charge of the local branch of the Cumberland Company at Franklin, Tenn.

George Mattox of Gas City, Ind., has arrived at Orange, Tex., where he will succeed W. C. Finklea, formerly district manager of the Southwestern Telegraph and Telephone Company.

Great Britain's Postmaster General, Herbert Samuel, who recently paid a visit to the United States and Canada, was very much pleased with our telephone system, and made a close examination with a view to adopting any improved methods of operation which he may deem advisable in the British government service.

F. D. Cleaver, who has been stationed at Davenport, Iowa, has been promoted to the office of division traffic superintendent at Des Moines.

F. A. McDougall, formerly manager of the Iowa Bell Telephone Company at Muscatine, has been named as superintendent of this division, with headquarters at Davenport.

Vance Oathout, manager of the Boone (Iowa) Telephone Company, left recently for Minneapolis, where he has accepted the position of assistant traffic superintendent of the Northwestern Telephone Company.

V. M. Way has been appointed assistant district manager of the Northwestern Telephone Company at Grand Forks, N. D. Mr. Way, who succeeds Mr. Geirie, has been employed in the contract department of this company for a number of years.

Frank V. Newman has been chosen secretary and treasurer of the Michigan Independent Telephone and Traffic Association.

F. W. McKee has been appointed commercial manager of the Home Telephone Company at Spokane, Wash. Mr. McKee comes from Great Falls, Mont., where he has made a reputation in automatic telephone work, being in charge at the installation of the first automatic telephone there.

H. R. Risley will remove his family from Spokane, Wash., to Great Falls, Mont., where he has assumed management of the local telephone system.

A. G. Krauss, formerly district commercial superintendent for the Boise (Idaho) district of the Mountain States Telephone and Telegraph Company, has been promoted to the position of special representative of that company, succeeding E. L. Taylor, resigned, who has for several years held that responsible position, with headquarters in Boise.

Charles W. Amory, widely known in financial and manufacturing circles, died recently at his residence at 278 Beacon street, Boston, Mass., following a prolonged illness. He was seventy-one years of age. Mr. Amory was identified with the American Bell Telephone Company, the American Telephone and Telegraph Company and the Western Telephone and Telegraph Company.

G. C. Bowden, district commercial manager for the Southern Bell Telephone and Telegraph Company of Tennessee, has been promoted from Decatur to Memphis.

NEWS FROM THE FIELD.

ALABAMA.

A recent fire destroyed the exchange at Gadsden.

The Gravette telephone plant is to be rebuilt and enlarged at an expense of about $11,000. This improvement, which will

begin in February, is a part of the general scheme of the Southwestern Telephone and Telegraph Company. Because of the rapid growth of business here, the standard system, such as maintained by the Bell company, is to be installed; a new switchboard and central office equipment, new cedar poles and 350 miles of new copper wire, enclosed in lead cables.

The Southwestern Telephone and Telegraph Company announced that it will spend $24,000 to give Batesville a modern telephone system. That will require an addition of 250 more poles and will mean several miles of new cables, in addition to the installation of a new switchboard and new telephone instruments similar to those used in Little Rock and other larger cities in Arkansas.

At a meeting of the City Council of Malvern, H. B. Mears, a local attorney, filed an application requesting the granting to himself and others a franchise for the installation and operation of a telephone system in this city, to be known as the Home Telephone System. The application states in event the franchise is granted, the new company will limit its charges to $2.50 a month for offices and business houses, $1.50 for residence, and in those instances where two or more patrons use a single wire the company agrees to permit the city to fix the charges. The application for a franchise for a new company may be attributed to a notice issued recently by the Southern Telephone Company, now occupying the local field, of an intention to advance rates. Action on the application was deferred to a future meeting of the council.

CALIFORNIA.

The Pacific Telephone and Telegraph Company has started improvement work authorized a few weeks ago and now has several crews of men at work on toll lines which are being extended and improved. About $75,000 will be spent in this work. The company will be ready to place its cable between Fresno and Calwa about the middle of December.

Telephone poles are now being hauled to Matheson Station for the Pacific Telephone and Telegraph Company for the new line, Oakland to Stockton, passing just south of Clayton.

Officials of the Pacific States Telephone Company have approved the appropriation of $10,000 for betterments of the Porterville service. This amount will be spent for extensions of city and suburban service, and will be additional to the recent large appropriation made for the installation of the up-to-date plant constructed in the new building now being completed on North Main street.

The Ducor Hot Springs Telephone and Telegraph Company will soon have a home of its own. At a recent meeting of the stockholders it was decided to purchase the lot adjoining the Ducor hotel. As soon as the building now on the lot has undergone the necessary changes the telephone exchange will be installed.

New switchboard equipment, to cost $63,000, and the expenditure of $32,000 for cables in the eastern section of Sacramento to generally improve the telephone service of the city has been approved by the board of directors of the Pacific Telephone Company, according to announcement made recently by Homer E. McKee, local manager.

The Dos Palos Telephone Company has been granted authority by the railroad commission to issue 1,272 shares of stock. Of this amount, 775 shares will be sold at $1 per share to provide additions to the company's system.

The Limoneira company of Oxnard has been granted a contract for the installation of sixteen miles of private telephone line on ranch property.

The California Railroad Commission has granted authority to the Pacific Telephone and Telegraph Company to issue $3,000,000 in bonds, the proceeds to be used to retire underlying bonds of the Sunset Telephone and Telegraph Company and for improvements in the company's system in various portions of the state.

It was announced that within a few months the Pacific Telephone and Telegraph Company will expend about $50,000 through the Stockton offices to improve its long distance service throughout the San Joaquin valley.

Charles A. Lorraine of Placerville has purchased a franchise for a rural telephone line along the Green valley road from Rescue to the Sacramento county line and along the Deer valley road.

Ranchers between Visalia and Klink are organizing an association with the idea of establishing an independent rural telephone line. A base line four miles long will be put in at an expense of $1,000 if thirty subscribers can be secured. The telephone company is co-operating in the matter to the extent of allowing a line of poles to be used by the new company for a part of the distance contemplated for the base line.

The new Hillcrest exchange of the Pacific Telephone and Telegraph Company was recently opened. The new station is located at University avenue and Sixth street. The building is of three stories and high basement, built of brick and concrete, at a cost of $45,000. The telephone equipment cost an additional $63,000. The plant has a capacity for 9,000 telephones and was built to take care of increasing business for some time to come.

CONNECTICUT.

A conference was held recently at Hartford between City Engineer Oldershaw and engineers of the Southern New England Company in regard to getting out a plan for the telephone system. The company proposes to show a layout of what it intends to do in the next twenty years. The Board of Public Works, which recently gave a hearing to representatives of the company, has no objections to the plan of the layout.

FLORIDA.

A telephone system to extend from Haines City to Davenport and Lake Walkes will be constructed by F. D. Shepherd.

The Home Telephone Company of Jacksonville will erect a $30,000 building.

GEORGIA.

R. E. Brown, Max L. James and others are organizing the Fruit Belt Telephone Company at Fort Valley.

Installation of the telephone block signal system on the 147 miles of the Southern Railway between Macon and Jessup is announced by Vice President and General Manager E. H. Coapman. A telephone line with stations at every passing track has been constructed and fifty additional telephone-telegraph operators have been employed.

Work on the new Southern Bell Telephone building, to be erected in Valdosta, has been commenced. The structure will be three stories and a basement and will be one of the most modern telephone plants in the south. The contract calls for its completion within three months.

ILLINOIS.

Commissioner R. R. Reynolds has notified the Tri-City Automatic Telephone Company that he has approved amended blueprints for the installation of conduits and the company is at liberty to begin actual work on the proposed plant at Rock Island.

The prospective telephone trunk line between Woodhull and Galesburg is now definitely provided for and will be built in the near futue. This will make a two-trunk line service between Woodhull and Galesburg. The Galesburg Union and the Woodhull Switchboard Association will each stand an equal part in cost of construction.

The Rock River Telephone Company of Rochelle has been making some big improvements in its office and telephone equipment. For weeks it has had a force of men installing a new switchboard.

Independent Telephone Association of America, Chicago; to aid independent telephone companies and improve their commercial, plant and traffic conditions. Incorporators, F. L. Eldridge, B. G. Hubbell, G. W. Robinson and Richard Valentine.

Officers of the Henry County Telephone Company and the Kewanee Home Telephone Company convened in Kewanee. It was a general conference between the heads of the two companies, called for the purpose of drawing up a new contract between for switching privileges between the two lines. The contract is for ten years, but a new arrangement is drawn up each year.

A new line will be built to improve the long-distance telephone service between Springfield and Peoria, by the Central Union Telephone Company.

A twenty-five-year franchise has been granted by the village board of New Canton to G. L. White to construct and operate a telephone system in the village.

The Abingdon Home Telephone Company is busy removing the old cables, wire and poles from the city.

The Central Union Telephone Company is rehabilitating its toll line between Peoria and Geneseo. When completed, the work will have cost close to $14,000. The Peoria-Geneseo toll line is 125 miles long and takes care of the toll traffic in fifteen towns.

The Central Union Telephone Company has a force of men at work setting up new poles between Savanna and Mt. Carroll. When they have completed the present stretch they will go on to Lanark, setting poles between that city and Mt. Carroll.

Work on the new home of the Rock Island exchange of the Central Union Telephone Company, being erected at 635 Eighteenth street, is now progressing rapidly and indications are that with favorable weather the building will be turned over to the owners by January 1, 1914.

The Central Union Telephone Company is rebuilding its lines from Beardstown to Rushville.

Equality Independent Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are Isaac White, John M. Berry, Jesse M. McLain, Joe G. Bunker and W. A. Aydelott.

The New Southwestern St. Libory Mutual Telephone Company has been incorporated with a capital stock of $500. The incorporators are John Mense, John Mueller and Henry Jaske.

The Central Union Telephone Company has for the past several weeks been remodeling and reconstructing its lines from Jerseyville west toward Hardin and south toward Alton.

Little progress is being made by the Home Automatic Telephone Company in securing a franchise at Watertown and Silvis, as well as in East Moline. At Watertown the village trustees adopted a resolution declining to consider the franchise unless the company would agree to the payment of $500 to the village, which has been refused. In Silvis the trustees asked for further time to consider.

The Inter-State Telephone Company is about to reorganize under a new name, according to reports from Aurora. A franchise is to be sought in St. Charles, where the only subscriber at present is the state home.

On account of the growing telephone traffic between Chicago and Elgin and intervening points, the Chicago Telephone Company proposes to spend $33,000 to rebuild its present pole lines and construct additional talking circuits. Two new circuits will be built between Chicago and Elgin, and new single circuits will be constructed between Chicago and each of the following points: Bensenville, Rockford, Franklin Park, Woodstock, Dundee. New circuits also will be provided between Elgin and Roselle and between Franklin Park and Oak Park.

The American Steel and Wire Company secured judgment in the Federal Court against the Western Telephone Company for $8,600, and, acting on that judgment, C. A. Dolph of Chicago and William G. McRoberts of Peoria were named receivers. While the amount of the judgment is not large, the property involved is valued at more than $500,000. The Western Telephone Company includes all of what are known as the C. M. Irwin properties, and takes in all the independent lines in Hancock, Adams, Schuyler and McDonough counties.

IDAHO.

The Falls Bannock Telephone Company of Arbon has filed articles of incorporation. The company is capitalized for $4,000. The incorporators are T. B. Evans, D. J. Bowen, H. Bailey, John C. Cairns, J. E. Keeler, William Allard, David B. Ripley.

The Aberdeen Commercial Club has undertaken the task to secure a telephone exchange for that town and surrounding country. A committee composed of President E. W. Harold, J. T. Dvorak and J. A. Toney are in Pocatello in consultation with Manager Kincaid of the Mountain States Company. It is believed that a local exchange will be installed at Aberdeen with connections serving between sixty and seventy patrons. The committee report Aberdeen to be in a flourishing condition.

INDIANA.

Alfont Telephone Company, Fortville; capital, $330; to operate a telephone company; directors, C. Ifert, J. K. Rash, N. Elsberry.

The Cumberland Telephone Company has just completed the erection of a new exchange at Patoka. The company will make an experiment in concrete poles near Haubstadt, putting in a lead of them about two miles long.

The New Long Distance Company of Kokomo, through its president, William Fortune, surrendered its franchise to the public utility commission. The city council of Kokomo granted the franchise. Under the public utility commission law, public utilities companies have the privilege of surrendering their franchises to the commission and continue operation under an indeterminate franchise granted by the commission.

IOWA.

The International Telephone Meter Company, Webster City, Iowa. Capital $1,000,000. Incorporators, E. H. Martin, M. M. Martin, Webster City, Iowa; Philip Lawrence, Huron, S. D.

The Iowa Telephone Company has cut down the number of districts in this state from six to four and the Burlington district has been discontinued and the force sent to Davenport. The move is in the interest of a more economical administration of the affairs of the company.

Newton Telephone Company has been incorporated with a capital of $3,500. Ole Thoreno is president and Oscar Solomonson secretary.

An interesting meeting of the directors of the Clarke County Mutual Telephone Company of Osceola was held at the court house. President D. M. Gibson presided and Secretary O. R. Shaw had charge of records. A good attendance of directors representing the several rural lines in the county were present. As indicated by the action of this meeting, it now seems assured that Clarke county is to have a mutual telephone system. The work of construction is to begin at an early date and the lines to be completed as soon as possible.

The Bancroft Telephone exchange, owned by Barney Gardner of Algona, has been sold to the Spencer Telephone Company.

The Bell and Jones county telephone plants of Monticello consolidated. L. S. Crousax of Anamosa, the commercial manager of the Iowa Telephone Company, was in town superintending the "cut over." Hereafter there will be but the one office.

The Western Electric Telephone system is building a third copper line from Mason City to Spencer. A new copper line, the fourth, is also to be built from Algona to Fort Dodge.

The annual meeting of the stockholders of Radcliffe Mutual Telephone Company was held recently and the following officers were elected: M. L. Hatlestad, president; E. T. Reisetter, vice-president; C. E. Myers, secretary and manager; H. D. Hummel, treasurer; A. J. Jones, H. H. Hagen, George Sampson, P. J. Hoffman and H. A. Drake, directors.

The Hastings Mutual Telephone Company has been reorganized. New officers have been elected and a manager appointed. A meeting was held to take steps towards putting the line in first class shape. The officers elected were: President, George Shaw; vice president, J. F. Martin; secretary, Fred Priest; treasurer, R. S. McDonough. The following constitute the board of directors: S. B. Hutchings, G. S. Purcell, Fred Martin. S. B. Hutchings has been made the manager.

A floor of the Linderman building at Clarinda has been leased to the Farmers Mutual Telephone Company for ten years and it will move in as soon as completed, probably January 1.

KANSAS.

L. J. Miller of Viola has purchased the system and is now sole owner of the Viola Mutual Telephone Company. The deal was made recently and recorded. The purchase includes the entire system in the town of Viola, as well as the line from Viola to Conway Springs and part of the line connecting Viola with Clearwater.

The Bell Telephone Company at Ottawa is contemplating renewing its application to the public utilities commission for a permit to boost rates.

At a conference held at Topeka between officers of the Bell Telephone Company and the State Utilities Commission the commission decided that it would not grant the company power to raise rates for promised improvements.

Officials of the Missouri and Kansas Telephone Company and members of the city commission of Wichita were to have held another conference on the rate case now pending before the State Utilities Commission, but the meeting was postponed. Mayor Babb received a communication from the telephone company deferring the conference until December 9.

KENTUCKY.

In response to petitions signed by practically all of the business men of Pineville and Middlesboro and the mine owners and operators of Harlan county, the Cumberland Telephone and Telegraph Company has consented to extend its lines from Middlesboro and Pineville to Harlan, the work of extension to be begun early in 1914.

MAINE.

The Pine Tree Telephone Company is installing a new switchboard in the Gray telephone office.

MARYLAND.

Permission for the Chesapeake and Potomac Telephone Company to purchase all the property and franchise rights of the Western Maryland Telephone Company of Allegany county was granted recently by the public service commission. The price stipulated was $245,000.

After a conference with J. L. Swayze of New York, general counsel for the Chesapeake and Potomac Telephone Company, Osborne I. Yellott of Baltimore, people's counsel, the announcement was made that there would be a speedy determination of the telephone rate case. In the presence of the public service

commission Mr. Swayze promised to co-operate with Mr. Yellott and aid him in obtaining all of the necessary data on which to base a decision. This includes a valuation of the property. It is expected that this will be ready by January.

The deed of transfer of the Western Maryland Telephone Company property and rights to the Chesapeake and Potomac Telephone Company was filed for record in the clerk's office at Cumberland. The consideration named in the deed is $99,377.50.

MASSACHUSETTS.

The island of Nantucket has been deprived of its telephone service by the action of Judge Sheldon in the Massachusetts Supreme Court in enjoining the Nantucket Telephone Company from doing business because of its failure to make its tax returns to the state tax commissioner, as required by the law.

MICHIGAN.

On account of the rapid growth of telephone traffic, the Michigan State Telephone Company is planning to spend $100,000 on improvements in the Hemlock, North Woodward, office district. The company's plans provide for the unification of the Michigan State and Home Telephone properties, extension of underground conduit, and for increasing and extending underground and aerial cables. Old and worn-out poles will be replaced, cross-arms on poles carrying cable will be removed and iron brackets substituted.

George Lucas and his crew of fifteen men, who have been at Menominee for the past two months making alterations and extensions to the system of the Michigan State Telephone Company, left for Iron Mountain, where costly improvements will be made by the company.

A change in the local management of the Michigan State Telephone Company has been made, by which G. L. Cleveland, manager, goes to the plant department of the company at Grand Rapids, and W. H. Sullivan, manager at Dowagiac for six years, comes to Albion.

A telephone line has been built from Rhodes and connected with the Pinconning exchange.

The Union Telephone Company's new district office building at Lansing is nearly ready for occupancy and it is expected that the transfer from the old to new exchange will be made shortly.

At a meeting of the directors of the Fayette Telephone Company of Jonesville repairs and improvements were under consideration. A committee of F. G. Varnum, A. N. Dudley and Elmer Shearman was appointed. A permanent location for the exchange and home of the manager is also under consideration.

In accordance with its franchise, the Citizens Telephone Company has filed its annual report with City Clerk Peter F. Gray. The report shows that the company has invested in Lansing $344,257.13. Its gross earnings during the past fiscal year were $57,844.89, and its expense of operation was $36,927.84, making the net earnings $20,917.05.

The Farmers' Telephone Company met at Petersburg for its annual meeting. The following officers were elected for the ensuing year: President, Ed. Osterhout; vice president, A. O. Elder of Petersburg; secretary, Fred King; treasurer, Ed. Gilson.

The Michigan Telephone Company has made an appropriation of $2,500 for the construction of a new farm line running into Hampton, Merritt and Portsmouth townships. This line will give telephone service to about fifty subscribers, and the the company expects to have it completed and in operation within a few weeks.

The Michigan State Telephone Company is expending about $4,000 in improving and repairing the long distance lead from Grand Rapids to Englishville.

MINNESOTA.

At a recent telephone meeting the Grapeland farmers decided to make plans for the rebuilding of their lines.

MISSOURI.

The St. James telephone system, owned and managed the past several years by Noel A. Kinney of Rolla, was sold recently to Floyd McComb of Greenfield, and immediate possession given.

Negotiations were completed in St. Louis, Mo., by which the Home Telephone Company will absorb the Missouri and Kansas (Bell) Telephone Company's plant and business at Joplin on or before May 1.

The Mercantile Trust Company has sold to the Southwestern Telegraph and Telephone Company the corner of Lockwood and Elm avenues, in Webster Groves, for the account of C. L. Merrill. This property fronts ninety-five feet on the north line of Lockwood avenue by a depth of 265 feet on Elm avenue to Moody avenue. It is the intention of the telephone company immediately to erect a modern building on this lot.

Equality Independent Telephone Company, St. Louis; Equality; capital, $5,000. Incorporators: Isaac White, John M. Berry, Jesse M. McLain, Joseph G. Bunker and W. A. Aydelett.

The Amoret Farmers' Mutual Telephone Company will be incorporated to succeed the present company.

People's Telephone Company of Graham, Nodaway county; capital, $6,510. Incorporators: G. M. McNeill, O. L. Mowrey and George Elliott.

MONTANA.

The following company filed articles of incorporation in the office of Secretary of State A. M. Alderson: Moore Telephone and Telegraph Company of Glasgow; capital stock $40,000. Directors, C. O. Moore, C. R. St. Clair and R. J. Moore, all of Glasgow.

NEBRASKA.

The stockholders of the Harvard Telephone Company held their annual meeting at the general office at Harvard. The following officers were chosen: Adolph Aspegren, president; Oscar Strand, vice president; George W. Phillips, secretary and general manager; Theodore Griess, treasurer.

Fred A. Howe of North Bend was elected president of the Farmers' Telephone Company of Fremont at the annual election of the board of directors. John Drengus of Scribner was named vice president and C. L. Kelly of North Bend was selected secretary.

The Ord Independent Telephone Company of David City is making preparations to move into new quarters.

The telephone office at Rogers has changed hands, Frank Randall again taking the management.

The Nebraska Railway Commission will hold a hearing December 2 on the application of the Sarpy Mutual Telephone Association to increase its rural rates from $1 to $1.50 a month.

The State Railway Commission received a message from E. W. Bemis, the eastern expert engineer, who is coming to Nebraska to make an investigation of the physical valuation of the telephone plants at York, conveying the intelligence that he would start very soon and that in case he could not get an expert by the name of Pillsbury to help him, he would bring another man by the name of Storm. The kick made by the York telephone subscribers against the valuation of the plant made by the railway commission physical engineers, requiring the commission to hire these experts from the east, will cost the state $75 a day for Bemis and $25 a day for his assistant.

NEW JERSEY.

The New York Telephone Company will erect a two-story building at Broadway and Twenty-ninth street, Bayonne, estimated to cost about $40,000.

NEW YORK.

Federal Telephone and Telegraph Company, 395 East Utica, two-story brick telephone exchange, $12,000.

The Alleghany County Telephone Company of Bolivar has material for a cable system, which is to be installed as soon as possible.

The Baldock Telephone Company of Baldock was commissioned to operate a farmers' line, the capital being $120. The petitioners are Wick Ashe, T. B. Warren and D. E. Strange.

The Aurora Telephone Company of Aurora was incorporated to conduct a telephone system, build lines, etc. The capital stock authorized is $10,000; subscribed $1,000, by W. A. T. Litchfield, Sue Litchfield, W. A. Thompson, C. M. Burton and others.

NORTH DAKOTA.

F. L. Shuman, district manager for the North Dakota Independent Telephone Company, at Elgin, states that his company will begin the erection of a building at once.

A telephone company has been organized at Sarles.

The Northwestern Telephone Company crews are at work in the south end of Grand Forks, laying the last of their conduits, in which they will place their wires.

A farmers' telephone company has been incorporated at Maxbass; capital $25,000. A. V. Stout, F. W. Rothert and others are interested in the new company.

Permission has been given the Sykeston-Johnson Telephone Company to build a mile of line at Harvey.

The Fairview Farmers' Telephone Company of Stanley

has been incorporated with a capital stock of $2,500 by O. G. Krueger, C. J. Platt and others.

The citizens of Kenmare are so proud of the new white way that the city attorney has been instructed by the council to start a legal action to have all telephone poles declared a public nuisance and to cause their removal from the main streets.

The Fairview Farmers' Telephone Company, at Stanley, has petitioned for the right to build along the right-of-way in the county.

The Long Lake Rural Telephone Company of Steele has been granted a franchise.

The Knife River Telephone Company, Oliver and Mercer counties; capital stock $24,960. Incorporators: S. A. Murray, Farrington, N. D.; W. D. Walsh and J. Frank Shattuck, both of Aplin, N. D.

OKLAHOMA.

The Pioneer Telephone Company of Oklahoma City is experiencing great difficulty in securing laborers for its proposed extensions through Osage county.

Thompson Rural Telephone Company of Okarche; capital $500. Henry Mueggenberg, Wesley Yeck, Henry Wittrock, J. O. Faler, Joseph Yeck, F. L. Kordis, Okarche.

The Pioneer Telephone and Telegraph Company will spend $38,000 on the improvement of its McAlester exchange. Eight carloads of material are now on the way and as soon as that material arrives work will commence on the overhauling of the plant. Estimates call for the setting of 396 poles and the stringing of 82,000 feet of aerial cable, to do away with open wire circuits in the congested business districts.

The Wilson Telephone Company of Wapanucka; capital $500. Incorporators, T. C. Wallace, E. D. Lail, I. W. Dunning.

The Pioneer Telephone Company of Oklahoma City is making preparations for moving its local offices, ground floor, into the front end of its building at Third street and Broadway. The office rooms are being thoroughly remodeled and will be among the best offices in the city when completed.

The foundation for the Davis Telephone building on Main street near Broadway, Tulsa, 25x90 feet, two stories, and of brick, is all ready, and it is expected that work on the superstructure will be begun within a short time.

The Pioneer Telephone Company of Boswell has completed stringing fourteen blocks of cable.

OHIO.

G. E. Hayward of the German National Bank, Marietta, who purchased the Marietta Telephone Company at court sale for $95,000, is said to have represented the interests which have been engaged for some time in reorganizing the National Telephone Company and its Ohio and West Viginia subsidiaries. It is expected that a new corporation will be formed to take over the property.

Telephone property in Ohio, comprising more than 700 telephone companies, has been appraised for 1913 by the State Tax Commission at an aggregate of $68,531,490, an increase over the total valuations of last year of $2,103,960. Nearly three-fourths of this increase—$1,414,310—will be borne by the Cincinnati and Suburban Bell Telephone Company, whose valuation is boosted from $8,849,690 to $10,263,000.

Vice-President Frank C. Dunbar of Columbus of the Ohio Telegraph and Telephone company filed a communication refusing the franchise granted that company for a period of ten years, which embodied a provision requiring the company to give the police department free use of its wires. This was the source of the objection urged by the grantee.

Stockholders of the Mt. Ephraim Telephone company object most strenuously to another company entering the field and have filed complaint with the state utilities commission against the extension of the lines of the Mt. Ephraim Farmers' Telephone company.

Ground has been broken for the new building to be occupied by the Barberton branch of the Akron People's Telephone company, the site chosen for the structure being a triangular plot of ground at the junction of East Park avenue, Bolivar road and First street. It will have a frontage of 26 feet on Park avenue, will be 38 feet wide at the rear and 90 feet deep. It is hoped the new exchange will be ready for occupancy not later than February 1.

Mayor John McClain, H. M. Allen and J. W. Safford of Troy went to Columbus recently to appear before the public utilities commission with a request of an increase in capital stock to rebuild and install an automatic system by the Troy Telephone company.

The franchise of the Bell Telephone company of Findlay granted by the city council twenty-five years ago expired recently. Nothing has been done for its renewal. The company is building many conduits to replace its wires on Main street and expects to erect a fine building to house its offices here within the next year.

OREGON.

According to the announcement made by A. B. Cridge, a prominent business man of Portland, petitions calling for the amendment of the city charter to provide for a municipal telephone system, to be owned or leased by the city, will be circulated at once. The matter will be placed before the people.

The annual meeting of the Dead Indian Telephone company, one of the branch lines out of Ashland, was held in this city recently. The corporation operates thirty miles of line and has twenty patrons. Officers were elected as follows: Charles Lindsay, president; J. J. Murphy, vice-president; George Owens, treasurer; F. W. Moore, secretary. These with George W. Jones constitute the board of directors. The company is constantly extending its lines to accommodate the ranchers in that district.

PENNSYLVANIA.

With the extension and improvement of the Clarr Telephone company's system in Bedford and Blair counties will come improved service and increased facilities for the telephone patrons of Windber.

The Consolidated Telephone company of Allentown recently formed by the merging of a number of local companies in the eastern part of the state, filed notice that it proposed to take on an indebtedness of $4,000,000. Colonel Harry Trexler of the governor's staff is one of the principal stockholders.

Charters were issued to two telephone companies, each with a capital of $5,000 and each with over 100 subscribers. The companies are the Cusswago Telephone company, Saegertown, and the Valmont Telephone company, McConnellsburg. Both will operate in localities surrounding their home offices.

In an interview with E. G. Simons, district manager of the Bell Telephone company of Pennsylvania, it was learned that the rapid growth of the service in Scranton during the last season calls for many new extensions in service. The new work will consist in underground feeder cables to relieve those which the rapid telephone development is beginning to overload, especially in the vicinity of Hyde Park. Extensions and additional cables will also be run in the vicinity of Green Ridge and Providence sections. This will include the construction of 35,500 feet of aerial cable and 13,200 feet of underground cable. It will also necessitate the construction of 3,400 trench feet of main underground the various neighborhoods. Ten manholes will be built. The total cost of these extensions to the service will be approximately $40,000.

H. E. Stoudt, Bethlehem, has been awarded the contract for a telephone exchange building for the Bell Telephone company, 27 by 114 feet, to be erected at Allentown. Cost, $21,000. John T. Windrim, architect.

The postoffice, telephone and telegraph exchanges of Knoxville were destroyed recently by fire.

The Western Pennsylvania Independent Telephone association, representing the independent telephone companies in West Virginia, Ohio and western Pennsylvania, holding its quarterly meeting in the First National Bank building at Uniontown, discussed the telephone rates and the female labor law. There were about forty officials of independent telephone companies present. The next quarterly meeting will be held in Pittsburg during January. The officers of the organization are: President, J. Walter Barnes, Fairmont, W. Va.; vice-president, K. B. Schotte, Kittanning; second vice-president, Dr. J. K. Brown, Brookville; secretary and treasurer, H. E. Webb, Pittsburgh.

SOUTH DAKOTA.

Almond Fjerstad and Clarence Fjerstad have purchased the property of the Estelline Electric Light and Telephone company and will conduct it in future. The consideration was $25,000. The new owners are enterprising men and it is assured they will give the public first class service.

TENNESSEE.

Decaturville Switchboard company of Decaturville, a mutual telephone company, no capital stock; incorporators, J. L. White, P. W. Miller, C. A. Smith, J. R. Rhoades, Frank Fisher.

The local exchange of the Cumberland Telephone and Telegraph company of Athens has had its office remodeled.

At a largely attended meeting of the stockholders of the Citizens' Telephone company at Columbia it was decided that no proposition for sale of the plant to the Cumberland Telephone company would be entertained.

TEXAS.

Business men of Kaplan have organized a company to build a telephone exchange and a toll line leading to Abbeville and Crowley. The corporation will be known as the Kaplan Telephone Company. They have secured from the police jury the right of way over the public roads to Abbeville.

Bids for the building of a two-story brick for the South Texas Telephone Company of Galveston have been opened by P. K. Higgins, general manager of the company. The bid of H. F. Drunagel, $9,200, was the lowest. Construction is to begin at an early date.

Berlin Telephone Company of Berlin. Capital stock, $1,500. Incorporators: W. H. Jencks, E. S. Repass of Grimes, J. H. Smith, V. S. Watson, N. B. Winters and H. Caldwell of Berlin.

Work was begun recently on the South Texas Telephone company's new $10,000 home on Beaumont avenue, Port Arthur.

The Port Lavaca Telephone company is making rapid progress on its new line between Seadrift and Bloomington.

VIRGINIA.

There is an amendment for the charter of the Black Mountain Telephone Company at Norfolk that enlarges the powers of the corporation so that it can develop and operate light and power plants and general electric current for commercial purposes, control water power and maintain water and light plants for supplying cities and individuals.

A fifty-ton cable was placed in Hampton roads between Old Point and Fort Wool by the Chesapeake and Potomac Telephone and Telegraph company. This will now insure quick service to peninsula towns and Norfolk. The cable was the largest ever built for Virginia's waters and it required a tug and thirty-five men to plant it in the Roads.

WASHINGTON.

The local telephone company at Chehalis, which is the center of one of the most extensive rural and local telephone systems on the Pacific Coast, has found it necessary to add to its quarters, and an extensive cement building has been added to the office and working room.

Approval has been received at the Spokane office of the Pacific Telephone and Telegraph Company for extensive improvements in the plant and equipment in the city and district at a cost of several thousand dollars. Plans have been approved for the establishment of a new exchange at Chewelah, in the Colville valley. The plans include a new cable plant and a new switchboard of sufficient size to care for immediate and future growth. When it is completed Chewelah will have a first-class telephone exchange. The cost will be about $6,000.

H. A. Gasham, a marine surveyor, has been instructed by the Canadian government to take soundings in Nodalles, Okis, and Cardero channels, waterways separating Valdez and Thurlo Island, and the mainland, in which something like 115 miles of telephone lines will be laid.

A franchise has been granted the Inland Independent Telephone Company to string wires through certain streets in Palouse in building the line from Spokane to Lewiston, but the company is not to operate an exchange there or long distance station.

President C. J. Farmer, of the Port Angeles Telephone Company announces the construction of new offices and exchange and the installation of a new system of cables.

A long distance line is being built to connect Pullman and Spokane. The Inland Co-operative Company will be connected with the Home Telephone Company of Spokane. Other lines will be built so that Pullman will have connections with northern Idaho, Montana and other points.

County Commissioner E. E. Teachnor of Centralia is president of what is believed to be the smallest telephone line in the world. The company, which is located in Lewis county, has only two subscribers. There are three shares of stock, two of which are owned by Teachnor.

WEST VIRGINIA.

The National Telephone Company is renewing lines from Wheeling toward Sherrard, by stringing new wire in place of the old that has seen many years' service.

Cyrus Huling has filed suit in the United States court at Wheeling, asking that the National Telephone Company of West Virginia be dissolved and its property sold. Mr. Huling represents that he owns all except $100,000 of the company's stock and that he is a large creditor; that the debts of the company amount to $1,000,000 and that it is losing money at the rate of $17,000 a year. This suit is believed to be the final step in untangling the affairs of the National Telephone Corporation.

WISCONSIN.

The New Era Telephone Company at a recent semi-annual meeting of its officers, held at Richmond, declared a three per cent dividend.

The Wisconsin Telephone Company at Milwaukee has announced that the North exchange will hereafter be known as the Lincoln and the South exchange as Hanover. The change will affect all prefixes which are now North or South.

The Black Earth Telephone Company at Milwaukee has filed an amendment increasing its capital from $4,500 to $6,780.

Extensive improvements to the system of the Wisconsin Telephone Company in Superior and throughout the state will result from an appropriation of $55,000 made at Madison by directors of the corporation. The Eau Claire district, of which Superior is a part, is apportioned the largest amount, $20,000. Other districts will receive: Appleton, $15,000; Madison, $12,000, and Milwaukee, $8,000. Much of the money will be spent in improving long distance lines.

The entire exchange of the Wisconsin Telephone Company at Green Bay will be constructed and the wires placed underground. The estimated cost is $61,000.

The Tri-State Telegraph and Telephone Company will erect a line from Minneapolis to Superior and Duluth, passing through Spooner.

Definite announcement has been made by the Wisconsin Telephone Company that it will put up a $200,000 building for its main exchange, south of the present building on Broadway, near Mason street, Milwaukee. It probably will be an eight-story structure. At its quarterly meeting the board of directors declared the usual 2 per cent dividend, and provided for the expenditure of $2,000,000 in improvements next year throughout the state.

Articles of incorporation were filed in the office of the secretary of state: The Clark Telephone Company, Colby; capital, $32,500. Incorporators: W. J. Rush, H. H. Christofferson and C. H. Brown.

The Clark County Telephone Company, incorporated, of Colby, has filed articles of incorporation, capitalized at $32,000. The incorporators named are W. J. Rush, H. H. Christofferson and C. H. Brown.

Otter Creek Telephone Company of Stanley has been incorporated with a capital stock of $1,000 by John J. Hatfield, James Niven and W. A. Abbott.

The Wisconsin Telephone Company is to spend about $30,000 in making extensions in its Beloit system.

A line is being built to Reeve by the Clear Lake Telephone Company. Another line will be run from Prairie Farm.

The East Valley Telephone Company of Auburn has been incorporated with a capital of $20,000 by A. G. Bartelt and Bertha and August Bartelt.

Work is under way on the erection of the new building for the Wisconsin Telephone Company at Eau Claire.

The Citizens Telephone Company is soon to install thousands of dollars worth of new cable throughout Sheboygan Falls.

The Dane Telephone Company has been incorporated with a capital of $1,600 by P. M. Derra, W. O. Dwyer, H. A. Koenig and others.

The Dane Telephone Company, with a capital stock of $1,500, filed articles of incorporation in the office of Register of Deeds Kroken. The company will engage in the telephone business in Dane and immediate vicinity. The incorporators are J. B. McChesney, Herman A. Koenig, Peter M. Derra and William O'Dwyer.

SASKATCHEWAN, CANADA.

The government telephone system of the province of Saskatchewan, Canada, expended $1,526,755 during the year ending February 28, 1913. The gross income amounted to $392,393. During the year construction was done as follows: New toll offices, 46; new exchanges, 34; pole miles, long distance, 516.22; wire miles, long distance, 3,766.8; and service was extended to 4,288 new subscribers during the year, making a total of 9,850 subscribers now being served. In addition to the government system there are, in Saskatchewan, 251 rural telephone companies, 22 independent companies and five municipal telephone systems.

INDEPENDENT CONVENTION.

The Independent Telephone Association of America will hold its first annual convention at Hotel La Salle, Chicago, Tuesday, Wednesday and Thursday, January 20, 21 and 22, 1914, to discuss matters of great importance to independent telephony. All independents should attend.

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